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# Journal of ORAL SURGERY

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*DEVOTED TO THE ART*

*AND SCIENCE OF*

*ORAL SURGERY*

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*Fred A. Henny, D.D.S., Editor*
HENRY FORD HOSPITAL, DETROIT

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## Scientific Articles

CORRECTION OF MANDIBULAR PROTRUSION
*Robert S. Van Alstine and Reed O. Dingman*.....273

CONTROL OF POSTANESTHETIC NAUSEA
*Edward C. Thompson and David C. Hazard*.....282

MANIFESTATIONS OF SYSTEMIC DISORDERS
*Robert B. Shira*.....286

USE OF TERRAMYCIN IN ORAL INFECTIONS
*George E. Morin and Irving G. Nathanson*.....307

NERVE BLOCK VIA PTERYGOPALATINE CANAL
*Hubert W. Merchant*.....310

TREATMENT OF FASCIAL ABSCESSES
*Norman R. Nathanson*.....313

REDUCTION AND FIXATION OF MANDIBULAR FRACTURES
*Sterling G. Mead and George D. Selfridge*.....316

## Case Reports

NONVITAL TEETH ASSOCIATED WITH CHORIO-EPITHELIOMA
*Andrew F. Catania*.....324

BILATERAL FIBROMA OF THE PALATE
*Morrison D. Beers*.....330

GIANT CELL TUMOR OF MANDIBLE
*Mellor R. Holland and Philip H. Moos*.....333

METASTATIC CARCINOMA OF MANDIBLE
*Harry M. Seldin, S. Daniel Seldin and William Rakower*.....336

REMOVAL OF FOREIGN BODY FROM SINUS
*Daniel Verne*.....341

Editorial.....343

Queries and Comments.....344

Book Reviews.....345

Current Literature.....347

Announcements.....351

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# Correction of mandibular protrusion in the edentulous patient

■ *Robert S. Van Alstine, D.D.S., M.S., and Reed O. Dingman, D.D.S., M.D., Ann Arbor, Mich.*

There is an abundance of material in the literature regarding the surgical correction of mandibular protrusion. As yet, however, no specific procedure for the completely edentulous patient has been described. Consequently, the purpose of this paper is to describe a technic for the correction of protrusive mandibular relations in the edentulous patient and to give a summary of experiences in five cases.

For edentulous patients with mandibular protrusion, complete dentures can be constructed, and a fair esthetic and functional result can be obtained by setting the artificial anterior teeth in an end-to-end relation. The construction of dentures, however, does not overcome the prognathic facies.

When the mandibular arch of an edentulous mouth protrudes 1 cm. or more beyond the maxillary arch, the appearance can be improved both in general facial symmetry and in the arrangement of the anterior teeth by a bilateral osteectomy.

## ■ *Technic*

The method used for the correction of mandibular protrusion in the edentulous patient is patterned after the two-stage operation of Dingman.[1] The patient must be carefully evaluated as a surgical risk; only patients in excellent condition are considered as candidates for this elective procedure. Maxillary and mandibular models are mounted on an articulator with a mandibular guide platform used as described by Barrow and Dingman.[2] The preferred site for the excision of the bone section is approximately 1 cm. proximal to the mental foramen. By the selection of this site the mental foramen can be avoided, optimum visualization of the op-

Department of oral surgery, University Hospital, University of Michigan.

1. Dingman, R. O. Surgical correction of developmental deformities of the mandible. Plast. & Reconstruct. Surg. 3:124 March 1948.

2. Barrow, G. V., and Dingman, R. O. Orthodontic considerations in the surgical management of developmental deformities of the mandible. Am. J. Orthodont. 36:121 Feb. 1950.

erative field during the first stage of the procedure is assured, and broad approximating bone surfaces are made available. The amount of bone to be removed is determined by the distance that the anterior mandibular ridge must be set back to obtain a normal maxillary-mandibular relation. Usually this purpose can be accomplished by making parallel cuts and setting the anterior section back to the desired position. If an open or closed bite relation exists, the section of bone to be removed may be made wider at the superior or inferior border of the mandible as the situation dictates. It may be desirable to remove a larger section of bone from one side than from the other to compensate for an asymmetrical relation of the mandible to the maxillary arch. After the amount of bone to be removed has been determined accurately, a template of sheet copper is cut to the exact width of the bone to be sectioned.

FIRST-STAGE OPERATION—The first-stage operation is carried out with a local anesthetic as an outpatient procedure. An incision is made along the crest of the ridge extending from the second molar to the cuspid region; next the mucoperiosteum is reflected on the buccal and lingual aspects of the mandible. On the lingual surface the exposure need be carried only inferiorly to correspond to the depth of the mandibular canal while the buccal reflection should provide exposure for the inferior border of the mandible. The mental neurovascular bundle is exposed and carefully retracted with the flap. The template is placed on the buccal aspect of the mandible at right angles to the crest of the ridge with the anterior margin approximately 1 cm. proximal to the mental foramen.

The lines of bone incision are marked by means of a sharp scalpel, and the cuts are made with a bone drill. The bone drill should be kept slightly inside the guide line to assure outlining exactly the properly sized segment. Transosseous incisions are carried to a depth just short of the inferior alveolar canal. The course of the canal should be checked by roentgenograms when the bone cuts are made, since the inferior alveolar nerve and vessels often turn upward as they approach the mental foramen.

A cut is made in the outlined segment along the crest of the ridge in an anterior-posterior direction through the alveolar bone into the medullary bone (Fig. 1, A). This is done to facilitate the removal of the buccal cortical plate in the second-stage procedure.

The lower extensions of the two buccal incisions are carried inferiorly only in cortical bone to the inferior border of the mandible to facilitate their identification at the time of the second-stage operation (Fig. 1, B). No bone is removed during the first-stage operation. The mucoperiosteal flaps are approximated with no. 0000 silk sutures. Both sides are operated on at this time. All sutures are removed on the fifth or sixth postoperative day. The oral tissues are permitted to heal for three to four weeks before the second-stage operation.

CONSTRUCTION OF ACRYLIC SPLINT—With the anterior and two posterior sections of the model in their new relation, the lines of incision are sealed with wax. After the anterior section has been set

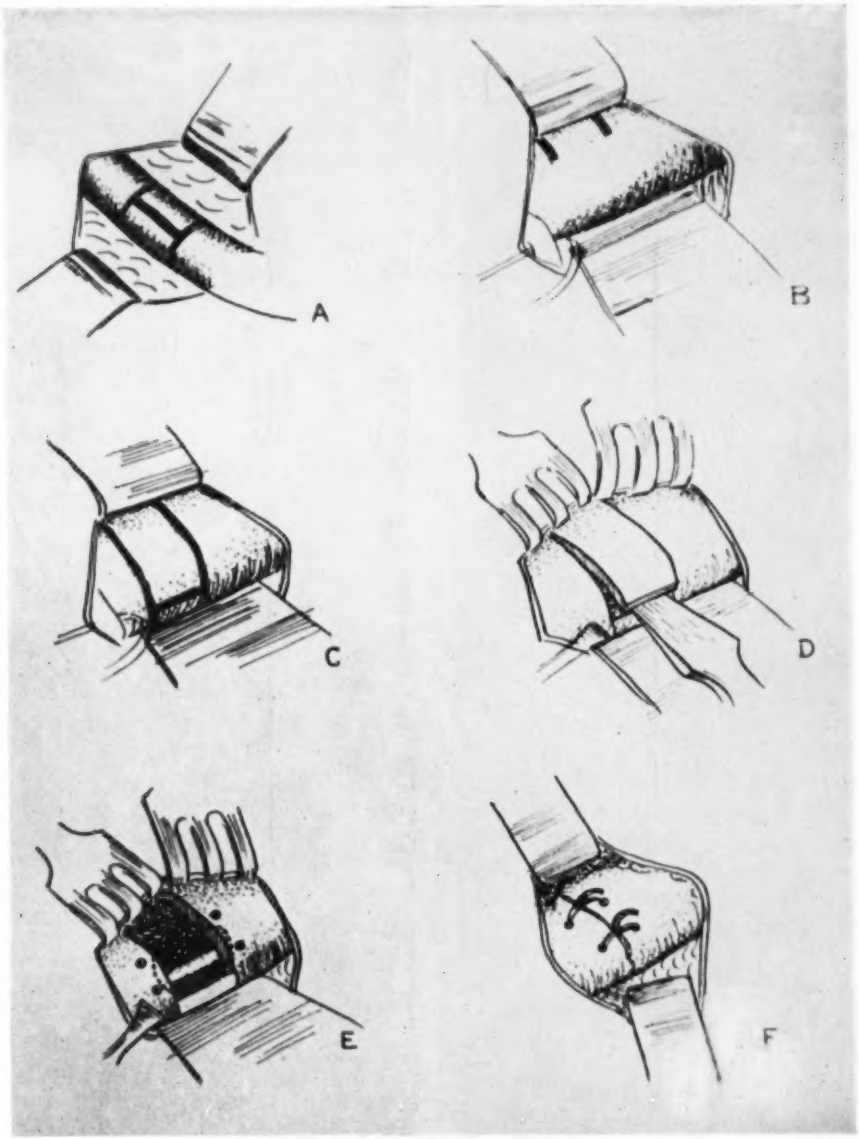



*Fig. 1—A, first-stage operation—transosseous and anteroposterior incisions; B-F, steps in second-stage operation*

back, there is often a discrepancy of a few millimeters between the height of the posterior and anterior alveolar crests. In this case wax is flowed over the line of junction of the two sections to provide a smooth contour and thus to prevent impingement by the splint. An impression is taken and a model poured, on which the acrylic splint is made. The flanges of the splint should not be carried deeply because of the possibility that pressure may cause necrosis in the sulci.

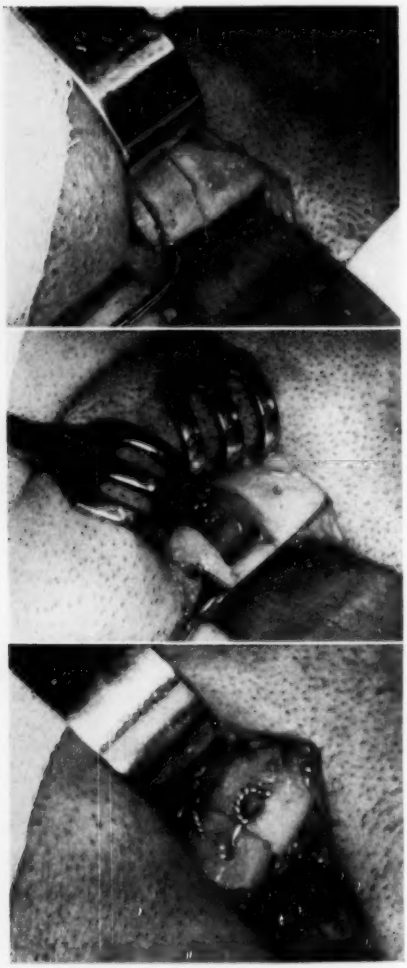


*Fig. 2—Above: Incision in buccal plate, extended to inferior border of mandible; anterior facial vein retracted. Center: Buccal cortical plate and medullary bone removed, exposing inferior alveolar neurovascular bundle. Below: Incised margins of bone apposed and maintained with no. 22 stainless steel wires*

SECOND-STAGE OPERATION—The second-stage operation is performed in the hospital operating room with a local anesthetic. Before the patient is draped, the proposed lines of incision are marked in methylene blue 1 cm. below the inferior border of the mandible. With this incision the mandible can be exposed with relative safety, as the mandibular branch of the facial nerve is retracted upward with the skin flap. At the posterior termination of the incision, if the anterior facial vein and the external maxillary artery are encountered, they are identified and retracted. The periosteum is incised and reflected from the bone both buccally and lingually to the crest of the ridge.

The inferior extension of the first-stage cuts are easily identified and carried downward to the inferior border of the mandible (Fig. 2, above). A posterior-anterior cut is made at the lower border of the mandible (Fig. 1, C), corresponding to the one made at the crest of the ridge during the first-stage operation. If the cortical bone has been incised

thoroughly, the outer plate of bone can be removed in one section by rotating a chisel or periosteal elevator inserted into the cut at the lower border of the mandible (Fig. 1, D).

With a sharp mastoid curet or a bone drill carefully used, sufficient bone can be removed to expose the contents of the mandibular canal (Fig. 2, center). After the position of the mandibular canal is determined, small holes are drilled both above and below it and about 4 mm. in from both the anterior and posterior bone margins (Fig. 1, E). The holes are drilled at this time because the mandible is much easier to control as one unit than after separation has been completed. By means of the bone drill and a curet, a recess is formed in the medullary bone on each cut surface to accommodate the mandibular nerve and vessels when the bone ends are approximated. A ribbon retractor is placed between the lingual periosteum and the mandible, and the lingual cuts are completed. After removal of the lingual section, the bone margins are carefully inspected; and any projecting spicules or uneven areas are smoothed with a rongeur forceps or a bone file. Number 22 gauge stainless steel wires are passed across the defect and twisted loosely. A damp sponge is placed in the wound while the operation is performed on the opposite side. The wires are then tightened on both sides and cut short (Fig. 1, F, and 2, below). The acrylic splint is inserted at the time of the second-stage operation before closure of the wounds so that the circumferential wires can be placed more accurately. Two circumferential wires are used on each side. After the splint is fixed firmly in position, the wounds are irrigated with warm saline solution; and the tissues are closed in layers by means of no. 0000 plain gut and the skin with no. 00000 Dermalon sutures. A bismuth tribromphenate and collodion gauze dressing is placed over the incision; it is supported by a pressure dressing. The splint (Fig. 3) should be left in place for seven to eight weeks, the time depending on the age of the patient and the accuracy of apposition of the bone margins as determined by roentgenograms.

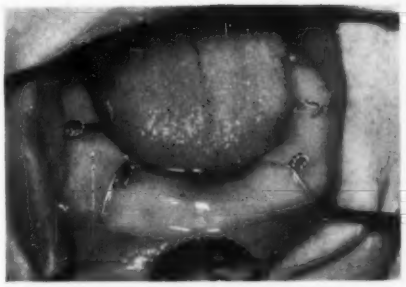


*Fig. 3—Acrylic splint fixed in position with four circumferential wires*

### ■ *Review of Five Cases*

Operations were performed in five cases. In three cases a splint was not placed at the time of the second-stage operation because two intraosseous wires were used on each side, one above and one below the mandibular canal. In one of these three cases healing was normal, and a denture was inserted four months later with a good result. The other two cases required stabilization with an acrylic splint five to six weeks after the second-stage operation. Three weeks after the splints were removed, excellent healing had taken place.

In the fourth case, the prepared splint did not fit correctly and therefore was not inserted at the time of the second-stage operation. A splint was inserted two weeks postoperatively and was not removed for eight weeks. At this time the regions of excision were well healed, and the mandible was firm on manipulation.

The patient was not seen for several months; when he returned for impressions for complete dentures, it was noticed that the mandible had assumed a protrusive relation. A careful study was made of the preoperative and postoperative models, of roentgenograms of the temporomandibular joints and of lateral views of the mandible. It was found that the posterior vertical dimension had decreased somewhat because of a forward and upward shift of the proximal segments. The vertical dimension in the anterior portion of the arch had increased. This alteration in the vertical dimension was probably due to the fact that the circumferential wires were not maintained tightly enough to prevent the displacing action of muscle forces.

In view of the fact that in three cases either no splint was used or the splint was placed several weeks after the operation with good results, the result in the fourth case may have been caused by an unconscious desire of the patient to assume his previous mandibular relation.

In the fifth case, a typical case, the patient's teeth had been removed in August 1951. Before their removal the mandibular anterior teeth had protruded beyond the maxillary teeth. The medical history was noncontributory. Examination of this 41 year old white man showed protrusion of the mandibular arch approximately 1 cm. beyond the maxillary arch. The protrusion of the mandible was the only abnormal condition. There was moderate protrusion of the symphysis region with respect to the upper portion of the face (Fig. 4, above, A and C).

Models were mounted on an articulator, and after study it was evident that an osteectomy should be performed (Fig. 4, below).

The first-stage operation (Fig. 5, above, left and right) was performed on August 20, 1952, in the outpatient clinic; infiltration and block anesthesia with 2 per cent procaine and 1:50,000 adrenalin were employed. Premedication consisted of pentobarbital sodium 0.2 Gm., morphine sulfate 10 mg. and scopolamine 0.4 mg. For three days after the operation, 400,000 units of procaine penicillin was administered. The sutures were removed in one week, and except for moderate edema the recovery was uneventful. An acrylic splint was constructed to fit the sectioned mandibular model.

The second-stage procedure (Fig. 5, center, left and right) was performed in the hospital operating room on September 12, 1952, with a local anesthetic. Again the premedication consisted of pentobarbital sodium 0.2 Gm., morphine sulfate 10 mg. and scopolamine 0.4 mg. After the anterior portion of the mandible had been set back into its new position, the splint was inserted. Two circumferential wires were placed on each side to hold the splint in position; then the intraosseous wires were retightened, and the wounds were closed.

Because this operation was performed in a state institution, for a period of eight weeks the patient remained in the hos-

pital, where an adequate liquid diet could be given. Roentgenograms, taken every two weeks, showed gradual deposition of bone at the lines of excision.

At the end of eight weeks the splint was removed. The oral tissues were well healed except for small regions of induration where the circumferential wires had penetrated the buccal sulcus. The mandible was firm, and on vigorous manipulation only a slight springiness could be elicited.

On January 19, 1953, approximately five months after the second-stage operation, complete dentures were inserted (Fig. 5, below left). On March 27, 1953, at the time photographs were taken and final roentgenograms were made, the facial contour was good (Fig. 4, above, B and D). The skin incisions were minimal and well healed. The arches were of good contour and the mucous membrane normal. The dentures functioned well and were esthetically pleasing.

Roentgenograms showed complete replacement of the lines of excision by

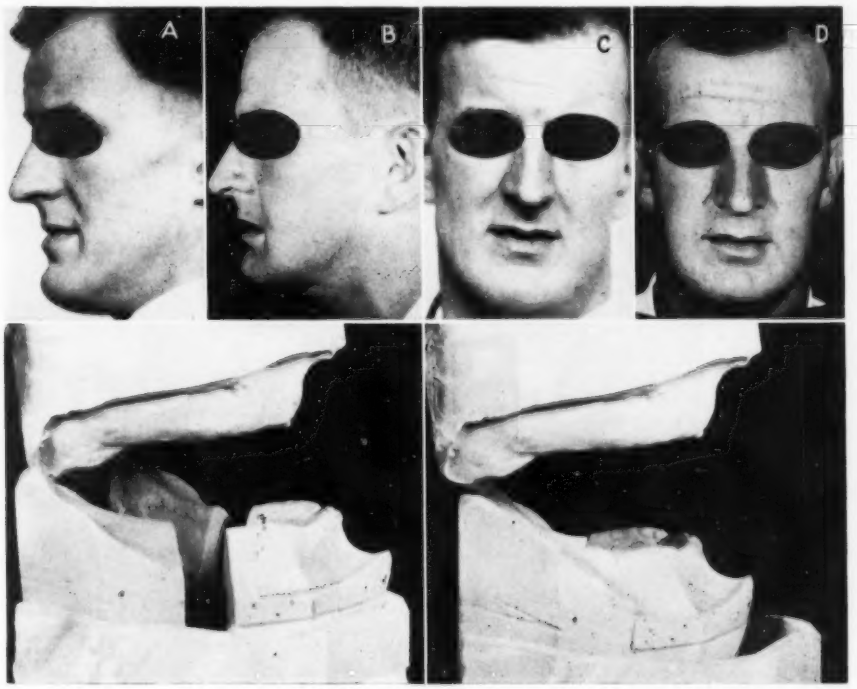



*Fig. 4—Above: A, preoperative profile; B, profile, five months after operation; C, front view, preoperative; D, front view, five months after operation. Below left: Degree of mandibular protrusion and amount of bone to be removed. Below right: Anterior segment moved posteriorly to improve intermaxillary relation*

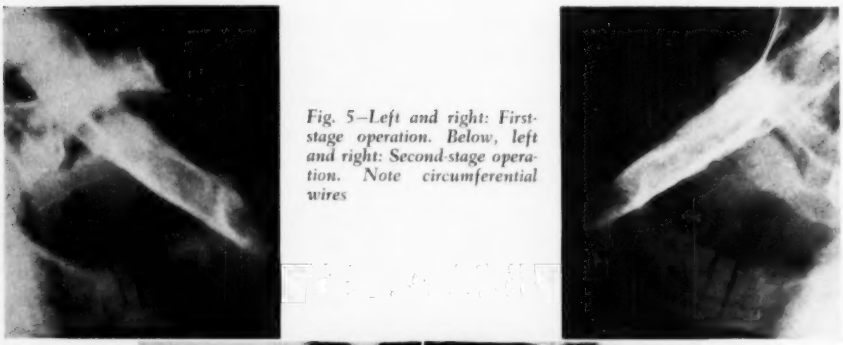
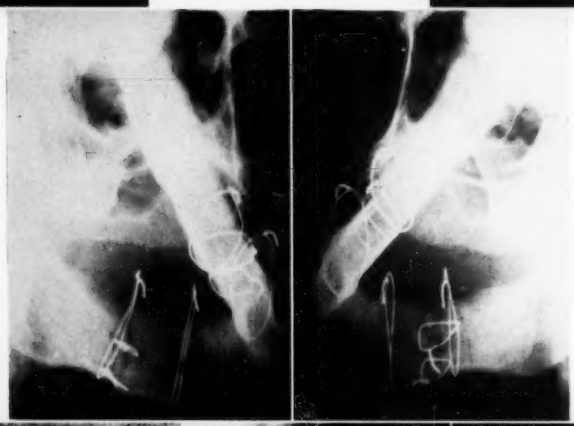
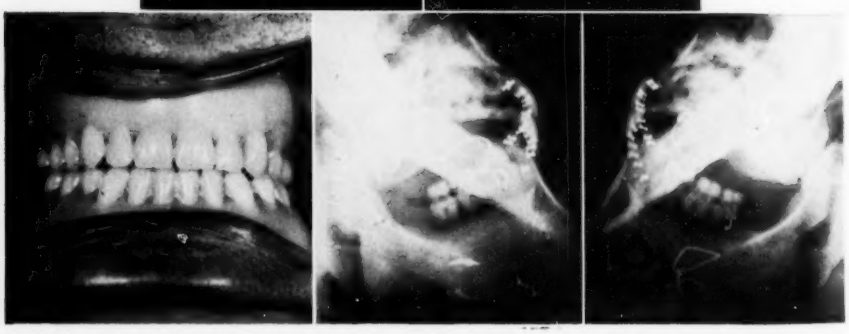


*Fig. 5—Left and right: First-stage operation. Below, left and right: Second-stage operation. Note circumferential wires*





*Left: Dentures, inserted approximately five months after second-stage operation. Center and right: Complete healing of operative site with new bone, five months after operation*

new bone. There was no sign of reaction around the intraosseous wires (Fig. 5, below, center and right).

■ *Discussion*

In operations, performed by the method described, on five male patients, aged 25, 28, 20, 32 and 41 years, no complications were encountered as far as the technic of the procedure was concerned. In four of the five cases both functional and esthetic results were pleasing. Although one operation was performed successfully without the use of a splint, the use of the splint is the method of choice. During the healing period, the patient should be observed closely for any signs of mandibular malrelation.

The average period of hospitalization was eight weeks. Since these operations were performed in a state institution where no liquid diet was available except in the hospital, the patients, of necessity, were hospitalized until healing was well established. Under normal circumstances, however, the period of hospitalization is three to five days.

It was noted that the period of bone healing was generally longer in older patients after fracture reduction and other bone surgery. Therefore, splinting should be maintained longer after osteectomy for older patients, and the operation should be reserved for those under 50 years of age who have adequate mandibular structure to permit firm fixation and normal bone repair.

■ *Summary*

The method described for the surgical correction of the protruding mandible in edentulous patients is a two-stage procedure which results in a normal intermaxillary relation and makes it possible for patients to wear dentures comfortably and efficiently.

■ Harnessing Sunlight

A chemical reaction that uses light energy to convert water into an explosive mixture of gaseous hydrogen and oxygen has been discovered by Lawrence J. Heidt of the Massachusetts Institute of Technology. Heidt and his collaborators are hopeful that the reaction, so far demonstrated only in the laboratory, can be developed into a large-scale process for turning sunlight into chemical energy.

The method employs a solution of the rare-earth element cerium. Cerous ions (plus-three valence) in the solution absorb light energy, react with water, are iodized to ceric ions (plus-four valence) and release hydrogen. Ceric ions also absorb light, and in so doing are reduced to the plus-three state and release oxygen. Thus a mixture of ceric and cerous ions under the action of light will jump back and forth between the two states and go on releasing hydrogen and oxygen.—*Science and the Citizen Scientific American 188:50 March 1953.*

# Control of postanesthetic nausea

■ *Edward C. Thompson,* D.D.S., Urbana, Ill., and David C. Hazard,† D.D.S., Fort Lewis, Wash.*

Postoperative nausea is observed with some frequency after any type of general anesthetic, although some types are more likely to induce this reaction than others. Since the control of nausea may tax the ingenuity of the oral surgeon, a good basic knowledge of the physiological problems involved is imperative.

## ■ *Nausea*

Nausea, according to Best and Taylor,[1] is a sensation that usually precedes the act of vomiting; however, it may occur alone. This sensation may be in the back of the throat or may occur as a "sinking" feeling in the epigastrium; it is often accompanied by profuse sweating caused by a vasomotor upset or possibly by increased tension on the stomach or duodenum.

Poulton[2] states that the sensation may be caused by distention of the lower portion of the esophageal wall and that it is relieved periodically by changes in the tension of the intestinal nerve endings which are affected by the peristaltic waves. Barclay,[3,4] who is in general agreement with this theory, states further that nauseous odors cause distention of the stomach, sagging of the diaphragm and the abdominal muscles and a resultant stretching of the esophagus, which in turn causes tension to be exerted on the nerve endings.

Apparently, the stimulus which induces nausea, although of lower intensity, is the same as that which causes visceral pain. The use of local counterirritants on the skin surface is of some value in relieving the symptoms of nausea.

## ■ *Vomiting*

MECHANISM OF VOMITING—The muscular movements of vomiting occur in response to efferent impulses arising from a center in the medulla. This center itself may be influenced by afferent impulses arising in almost any part of the body as a result of such stimuli as pain or irritation of the intestinal tract or by direct excitation of the vomiting center in the medulla by means of substances conveyed in the blood stream, for example, apomorphine. The latter may be the mechanism involved in the type of vomiting experienced in pregnancy.

The vomiting center lies in the medulla near the dorsal nucleus of the vagus nerve and the respiratory center.[1] The act of vomiting is impossible if this center is destroyed since it acts as a recep-

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1. Best, C. H., and Taylor, N. B. The physiological basis of medical practice; a text in applied physiology, ed. 5. Baltimore, Williams & Wilkins, 1950.

2. Poulton, E. P. Oliver-Sharpley lectures on experimental study of certain visceral sensations. Lancet 2:1223 Dec. 15, 1928.

3. Barclay, A. E. Mechanics of digestive tract. Lancet 1:11 Jan. 6, 1934.

4. Barclay, A. E. Normal mechanism of swallowing. Proc. Staff Meet., Mayo Clin. 5:251 Sept. 10, 1930.

tion center for afferent impulses and a control board for motor cranial nuclei.

The efferent fibers are contained chiefly in the phrenic, vagus and sympathetic nerves; but fibers are carried also by spinal nerves to the abdominal muscles and by cranial nerves to the pharynx, palate and other organs.

INDUCTION OF VOMITING—Vomiting is usually induced (1) by impulses originating in the stomach or some other organ of the body, (2) by impulses from the cerebral centers, (3) by material carried in the blood stream.

Vomiting as a reflex action is usually induced by mechanical or chemical irritants of various kinds that act on the vagal and sympathetic afferent terminals of the gastric mucosa and in this way stimulate the vomiting reflex. In this class are various emetic agents such as antimony tartrate, copper sulfate, salt and mustard water.

Mechanical stimuli affecting the pharynx and tonsillar fauces induce emesis. Inflammation or mechanical disturbances in the intestinal tract, such as appendicitis, obstruction, and strangulation of hernia may cause vomiting.

Impulses from the kidney, bladder, uterus, gallbladder, heart or any other viscus may induce emesis independent of any stomach condition. Hatcher and Weiss[5] have shown that some substances such as digitalis and pilocarpine in large doses cause emesis through action on the heart. Tartar emetic causes vomiting through action not only on the cardiac branch of the vagus nerve but also on gastric nerve endings.

Severe pain in any location, strong, unpleasant emotion or impulses from organs of special senses—smell, taste or sight—may cause vomiting. Stimulation of the nerve endings in the vertical semicircular canals (vestibular nerve) is considered the most potent factor in the causation of seasickness, though the impulses arising from the stomach and retinae are contributory.

ACT OF VOMITING—The act of vomiting, usually preceded by nausea, is the ejection of the stomach contents through the mouth. The ejection is accompanied by strong contractions of the sphincter muscles in the pyloric part of the stomach. Simultaneously with these actions the abdominal muscles contract and the diaphragm descends. Thus the stomach is compressed; since its contents cannot pass through the constricted pylorus, they are forced through the cardia into the esophagus. The esophagus, being relaxed throughout its length, permits free passage upward of the stomach contents. There is no evidence in adults of ascending peristalsis, although there is some evidence of such a movement in infants.

VOMITING ACCOMPANYING USE OF ANESTHETICS—Certain anesthetic agents such as ether-ethyl chloride cause increased irritability of the vomiting center in the medulla during the first stage of anesthesia. Anoxia during anesthesia causes a tendency to vomiting both at the time and later.

This type of vomiting occurs as a result of conditions that cause a profound

5. Hatcher, R. A., and Weiss, S. Studies on vomiting. J. Pharmacol. & Exper. Therap. 22:139 Oct. 1923.

fall in blood pressure, for example, the reaction occurring in procaine block anesthesia or in spinal anesthesia. This reaction is caused by the anoxia created in the medulla. Nausea and vomiting may be of varying intensity when they are due to irritation of the gastric mucosa by the swallowing of large amounts of mucus and secretions during the administration of the anesthetic. Another factor always to be taken into consideration by the oral surgeon is the postoperative swallowing of blood.

Certain drugs, for example, morphine, frequently cause nausea as a side effect. Dilaudid, 1/14 grain, or 100 mg. of Demerol may be substituted for morphine.

■ *Treatment*

If nausea and vomiting occur, a thorough evaluation of conditions and examination of the patient should be made in an effort to ascertain the cause. Determination of the time of the onset is of great value. It is important to know also if the onset occurred when the patient awakened from anesthesia, if it was delayed, or if it took place at meal time and in addition whether the nausea or vomiting was continuous or spasmodic.

In ascertaining the cause, the following questions should be answered:

1. Were there any gastric irritations from the swallowing of blood or secretions at the time of anesthesia?
2. Does the anesthesia record show whether the patient was anoxic at any time or whether the anesthesia was prolonged?
3. Is the patient having extreme pain?
4. Is the patient a stable individual or a very nervous person seeking attention?

It should be kept in mind that if the nausea and vomiting were delayed in onset or were long and severe and if there was no response to treatment, some more serious condition may exist such as acute dilatation of the stomach because of air, intestinal obstruction or peritonitis secondary to an acute condition of the abdomen.

If the nausea and vomiting are caused by the swallowing of irritating secretions and blood, usually the emptying of the stomach contents is sufficient to check the vomiting. Should this type of nausea and vomiting persist, however, it may be necessary to pass a stomach tube and wash out the stomach. Mucous accumulations of secretions come not only from the stomach but also from the passages above it.

In cases of prolonged nausea and vomiting, the placing of a small stomach tube through the nose and permitting it to remain in position with constant suction (Wangensteen) applied provide for the continuous removal of irritating secretions.

■ *Fluid and Fluid Intake*

In addition to the above measures, the patient may be given small quantities (teaspoon) of finely shaved ice with 10 minims of Adrenalin Chloride (solution 1:1,000) in a small glass of cold water. This same amount may be given to the patient again in an hour if necessary. It is thought that the Adrenalin Chloride reduces the hyperemia of the stomach. Essence of peppermint, 5 to 10 drops, on a lump of sugar or in cold water may be

of some help. These are methods to be used only in extremely severe cases. As the nausea comes under control, the patient should be given frequent sips of carbonated water.

If the vomiting is the result of prolonged anesthesia, preoperative or postoperative medication, preoperative starvation or a combination of these factors, the taking, hourly for five or six hours, of small quantities of carbonated water with mild tea and clear soups with or without bismuth subcarbonate is beneficial.

For adults ½ to 3 grains of pentobarbital sodium, administered rectally and repeated every six hours, is helpful as is also 1/150 to 1/100 grain of atropine administered either orally with carbonated water or hypodermically.

If the nausea is not controlled by one of the preceding methods, more adequate treatment may be needed; and one of the following medications may be indicated:

1. Dimenhydrinate, 100 mg. tablets, 1 tablet every 4 hours, administered orally. This drug has a tendency to make the patient extremely sleepy and should be administered with care until the patient's dosage has been determined. The initial dose for small individuals should be ½ tablet (60 mg.).

2. Phenobarbital sodium, administered hypodermically. This drug comes in small size ampules for intravenous injection. It may be administered also with atropine, 1/150 to 1/100 grain.

3. Certain mixtures of vitamins, administered intravenously.

If the nausea is not controlled easily by one or more of these agents, additional investigation and treatment are indicated. Since prolonged vomiting produces dehydration, it may become necessary to replace lost body fluids by means of intravenous fluids. The amount required will be governed by the patient's intake and output of fluids.

In addition to medication, nursing care is of utmost importance in the management of the nauseated patient. If the patient is conscious, the mouth should be rinsed after each period of vomiting. Care should be taken to remove immediately all soiled clothing and bedding and also contaminated emesis basins, since the odor of vomitus itself may induce further emesis.

The early intake of food after periods of nausea and vomiting is of great aid in the return of the body to a normal physiologic state. Large quantities of food difficult to digest may reactivate the mechanism of nausea and vomiting. Types of food which have been found to be helpful in the treatment of nauseated patients are clear unseasoned soups and broths, fresh dry toast without butter, clear weak tea, skimmed milk and thin liquid jello. In the feeding of a patient who is or has been nauseated, it has been found through experience that small frequent feedings of an ounce or two are tolerated although larger feedings may produce nausea. This is especially true when the cause is gastric irritation.

Management of postoperative nausea is a complex problem which requires control of mechanical, physiological and emotional factors, all of which may combine to produce a given situation. A thorough study of these factors is imperative if management is to be effective.

# Manifestations of systemic disorders in the facial bones

■ *Robert B. Shira, D.D.S., San Francisco*

The manifestation of systemic disorders in the facial bones is a relatively rare phenomenon. Conditions caused by these disorders may be observed during routine oral roentgenographic examinations, and the discovery and investigation of oral changes may lead to a diagnosis of some generalized systemic disorder. Unusual appearances in a dental roentgenogram should arouse the suspicion of the examiner that some systemic condition might be involved. Any lesion of the facial bones for which the diagnosis is doubtful is an indication for a complete physical examination, a bone roentgenographic survey and blood chemistry studies in order to rule out or establish a systemic cause for the condition. Not only those practitioners who are associated with larger hospitals or medical groups and thus have the opportunity to observe a greater number of cases in which there are manifestations of these disorders in the facial bones but everyone in the dental profession should be on the alert for these unusual conditions and at least recognize that they are not of dental origin. There are many oral findings and observations which are not diagnostic in themselves but which, studied as a part of a complete physical evaluation, lead to a correct diagnosis.

If systemic disorders are observed in the facial bones, emphasis should be given to the roentgenographic findings and clinical observations as well as to changes in the blood chemistry. The diagnosis of many of these conditions is definitely out of the province of the oral surgeon, but the oral surgeon should be familiar with these various disorders and have some knowledge of the significance of the medical examinations and procedures used in diagnosis and treatment of such conditions.

## ■ *Disturbances of the Reticuloendothelial System*

Among the disturbances of the reticuloendothelial system are three closely related conditions: Letterer-Siwe disease, Hand-Schüller-Christian disease and eosinophilic granuloma of bone. The reticuloendothelial system comprises certain cells known as reticuloendothelial cells, which, although situated in many different parts of the body, have certain similarities in morphology and function.[1] Their best known function is phagocytosis; but they are able also, after a process of differentiation, to become cells of the circulating blood. The formation of antibodies is a further function of these cells. The cells

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1. Anderson, W. A. D., editor. Pathology. St. Louis, C. V. Mosby Co., 1948, p. 1010.

are widely distributed throughout the body: in the lymph nodes, spleen, liver, bone marrow and connective tissue.

A disturbance of the reticuloendothelial system may affect any of the tissues or organs in which the cells are located. The disturbance caused by one of these three diseases is basically a proliferation of the reticular cells and of histiocytes. The etiology of the disturbance is unknown, but it is believed by Mallory[2] that it is possibly a response to some as yet undiscovered specific infectious agent.

LETTERER-SIWE DISEASE—Because of the widespread distribution of the reticular cells and histiocytes in Letterer-Siwe disease, many parts of the body may be involved; namely, the bone marrow, spleen, liver, lymph nodes and visceral organs. The disease occurs in young children, usually under the age of two or three, and commonly runs a fatal course, lasting only a few months. It is manifested clinically, in varying degrees, by enlargement of the spleen, the liver and the lymph nodes; by a chronic progressive anemia; by characteristic purpuric or ecchymotic cutaneous eruptions; by persistent intermittent low-grade fever; by a tendency to hemorrhage without a reduction in the blood platelets; and by destructive lesions in the bones.[3] The bone lesions, caused by an accumulation of the rapidly proliferating histiocytes in the marrow, usually occur in the calvarium (Fig. 1, left); but other bones may be involved.

In the roentgenogram the bone lesions present a typical "punched out" area starting in the marrow. The margins of the defect are irregular, and little inflammatory reaction is seen about the involved areas. As the disease progresses, the cortex is thinned and finally perforated.

2. Mallory, T. B. Medical progress; pathology, diseases of bone. New England J. Med. 227:955 Dec. 17, 1942.

3. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 191.

*Fig. 1—Letterer-Siwe disease. Left: Destructive lesion of skull. Center: Destruction of osseous tissue of mandible by rapidly proliferating histiocytes. Right: Tumor, originating in bone marrow, which has broken through cortical plate, completely filling that part of the buccal vestibule and extending over teeth*

Oral manifestations of Letterer-Siwe disease originate in the bone marrow. An area of bone destruction becomes evident in the roentgenogram and has the same appearance as the lesion in any other bone (Fig. 1, center). As it progresses, the cortex may be thinned from within and finally perforated. The rapidly proliferating histiocytes may then involve the soft tissue and on occasion reach such proportions as to cover the teeth completely (Fig. 1, right). Soft tissue involvement is manifested by a rapidly proliferating tumor mass that is soft, friable, reddish purple in color and gelatinous in consistency.

Diagnosis is made from clinical observations, biopsy of the soft tissue or osseous lesions, and the course of the disease. The biopsy reveals a diffuse proliferation of histiocytes with an occasional giant cell. There are usually no xanthoma cells. The course of the disease is characterized by rapid deterioration and death, usually within six months.

The treatment consists of radiation therapy of the involved regions and general supportive measures. The lesions are extremely radiosensitive but recur rapidly. On rare occasions the condition becomes chronic and gradually changes into Schüller-Christian disease. A true case of Letterer-Siwe disease is refractory to all treatment and runs a rapidly fatal course.

HAND-SCHÜLLER-CHRISTIAN DISEASE—Hand-Schüller-Christian disease also is manifested by a proliferation of histiocytes. For many years this disease was classified with the xanthoma diseases (diseases of lipid metabolism) because of the presence of a lipid, cholesterol, in the histiocytes. Primarily because of the work of Chester,[4] it is now believed that the primary disturbance is a proliferation of connective tissue and cells of the reticuloendothelial system, forming granulomas containing large numbers of histiocytes. As these lesions develop, many of the histiocytes take up cholesterol esters and are thus transformed into xanthoma or "foam cells." The term "lipid granuloma of bone" has been suggested by Chester as being more appropriate for this disease.

Hand-Schüller-Christian disease on occasion has a triad of symptoms: exophthalmos, diabetes insipidus and osteolytic defects in bone. Often all these symptoms are not present. The exophthalmos is caused by a retro-orbital localization of the granulomatous mass, which forces the eyeball to protrude. The diabetes insipidus and other pituitary manifestations also are caused by the development of the granulomatous lesions in the pituitary gland and neighboring centers. The bone lesions, caused by the accumulation of histiocytes in the bone marrow, usually occur in the calvarium (Fig. 1, left) and have characteristic round, oval or irregular radiolucent areas with a sharp clear margin without any inflammatory changes at the periphery.

Oral manifestations of this disease arise in the bone marrow and are characterized by regions of destruction resulting from the granulomatous lesions in the marrow. As the lesions increase in size, the bone supporting the teeth is destroyed, with resultant loosening of the teeth. Stafne[5] states:

4. Chester, W. Über lipoidgranulomatose. Virchows Arch. f. path. Anat. 279:561, 1930.

The roentgenographic appearance of the lesions in bones, particularly those of the skull, is diagnostic, and that of the jaws when the disease occurs in children, is probably more so. In the jaws of children the pads of granulomatous tissue have a predilection for forming in the periapical regions of the teeth. With expansion of the lesions the sockets are destroyed and the deciduous as well as the developing permanent teeth are forced from their original position and exfoliated. With the bone surrounding the teeth destroyed, the roentgenograms give the appearance that the exfoliating teeth are floating in space.

Hand-Schüller-Christian disease is primarily a disease of early childhood, although several cases have been observed in adults. Males are affected about twice as frequently as females. The disease often takes a fatal course, about a third of the cases terminating fatally. Death is usually caused by damage to the hypothalamus, pituitary gland, lungs or heart. The disease is not always incurable. Several cases have been known in which the bone lesions disappeared spontaneously, and other cases have been reported in which the lipoid granuloma disappeared after roentgenotherapy.[6] Treatment of the oral lesions consists of removal of the loose teeth and roentgenotherapy of the involved bones.

EOSINOPHILIC GRANULOMA OF BONE —Eosinophilic granuloma of bone was first described by Otani and Ehrlich[7] in 1940 and by Lichtenstein and Jaffe[8] in the same year. It was originally described as "solitary eosinophilic granuloma of bone"; but as more knowledge was gained, it was soon evident that the lesions could be multiple. The basic pathological process is similar to that of Letterer-Siwe disease and Hand-Schüller-Christian disease, but it does not have the fatal implications of these conditions. It is considered the benign form of the disturbance.

Clinically the disease is observed in children and young adults and is usually manifested by proliferation of histiocytes and eosinophils which are limited to the bone marrow. Involvement of the visceral organs is rare although occasionally a fine nodular infiltration in the lungs may be seen. There may be a papular, erythematous skin eruption. Peripheral eosinophilia is occasionally noted. The bone lesions are characterized by round or oval irregular regions of bone destruction, starting in the interior part of the bone marrow and eroding the cortex from within. Except for the localization of the lesions, the roentgenographic appearances of bones affected with eosinophilic granuloma do not differ greatly from those seen in Letterer-Siwe disease and Hand-Schüller-Christian disease. Pain and swelling may be present, but often the lesions are silent. Spontaneous fractures occasionally lead to discovery of the disease.

When the oral structures are involved, the disease starts as a central bone lesion, eroding the cortex and occasionally involving the overlying soft tissue. As the lesions in the facial bones progress, the teeth become loose because of the destruction of the supporting osseous tissue (Fig.

5. Stafne, E. C. Dental roentgenologic aspects of systemic disease. J.A.D.A. 40:265 March 1950.

6. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 187.

7. Otani, S., and Ehrlich, J. C. Solitary granuloma of bone simulating primary neoplasm. Am. J. Path. 16:479 July 1940.

8. Lichtenstein, L., and Jaffe, H. L. Eosinophilic granuloma of bone, with report of case. Am. J. Path. 16:595 Sept. 1940.

*Fig. 2—Eosinophilic granuloma of bone. Left: Bone lesions caused by accumulation of histiocytes in marrow. Right: Same type of lesion in ilium, detected in bone survey after discovery of eosinophilic granuloma in mandible (left)*

2, left). Rarely are the roots resorbed. Pronounced resorption of the alveolar process is a frequent finding. There may be an inflammatory process which involves the soft tissue overlying the lesion and also swelling and pain. Biopsy of the bone lesions reveals a proliferating mass of histiocytes with active phagocytosis. The lesions may contain granules, occasionally lipoid-filled, and brownish pigment. Varying numbers of eosinophils are seen. The same type of lesion may be detected elsewhere in the body (Fig. 2, right).

Eosinophilic granuloma of bone is considered a benign lesion, and treatment gives satisfactory results. Oral lesions respond well to local surgical excision, curettage or roentgenotherapy. Spontaneous disappearance of the bone lesions, especially after pathological fracture, has been reported.

In these three disturbances of the reticuloendothelial system, the basic pathological process is probably similar, although the clinical course is entirely different. The microscopic findings in each disease are essentially the same; clinical observations and determination of the course of the disease are essential in establishing the diagnosis.

■ *Gaucher's Disease*

Gaucher's disease is a true xanthoma, probably representing an "inborn error in lipid metabolism," in which large quantities of a particular lipid, kerasin, are found in the cells of the reticuloendothelial system. The disease is characterized by an infiltration of the reticular cells and histiocytes of the spleen, liver, bone marrow and lymph nodes by this lipid. The disease is congenital in origin, affects females more often than males and has a tendency to occur more frequently in the Hebrew race.[9]

Clinical manifestations are a slowly progressing enlargement of the spleen; enlargement of the liver; changes in the bone, manifested by a progressive osteoporosis, enlargement of the bone marrow and thinning of the cortex; anemia, leuko-

9. Geschickter, C. F., and Copeland, M. M. Tumors of bone. Philadelphia, J. B. Lippincott Co., 1949, p. 566.

penia and thrombocytopenia; and occasionally abnormal pigmentation of the skin. The peripheral lymph nodes are usually not enlarged although the internal lymph nodes are nearly always enlarged and colored brown because of deposit of pigment. The entire skeleton is generally involved, but the disease usually localizes in the lower end of the femur, where it causes a swelling which resembles an Erlenmeyer flask.

Changes in the facial bones in Gaucher's disease are rare. Bender[10] reported two cases in 1938; in one of these cases it was the findings in the dental roentgenogram that led to the discovery of the systemic disturbance. In the case shown in Figure 3, above, it was also the findings in the dental roentgenograms that led to the diagnosis of Gaucher's disease. When changes do occur in the facial bones, they are manifested by an infiltration of the bone marrow by the histiocytes containing the lipid, kerasin. This infiltration causes a generalized osteo-

10. Bender, I. B. Dental observations in Gaucher's disease. J. D. Res. 17:359, Oct. 1938.

*Fig. 3—Gaucher's disease. Above: Osteoporosis and destruction of mandible, resulting from collection of histiocytes containing lipid, kerasin, in bone marrow. Below left: Swelling bone, osteoporosis and destruction of cortex of mandible. Note root resorption. Below right: Specimen from mandible*

porosis, enlargement or swelling of the bone, enlargement of the cancellous regions and thinning of the cortex (Fig. 3, below left). In some instances there may be resultant loosening of the teeth, resorption of the roots and exfoliation of the teeth.

Diagnosis is made from clinical observations and a biopsy of the bone lesions. The microscopic findings reveal cells of the reticuloendothelial system which are enlarged because of their kerasin content. They are strikingly uniform, large (20 to 80 microns), with a small nucleus and large cell bodies. The cytoplasm is clear but contains granules and striation. These cells have been called "Gaucher cells" or "foam cells" (Fig. 3, below right).

Of particular interest to the oral surgeon is the abnormal bleeding tendency of patients with Gaucher's disease. This is probably caused by the changes in the hematopoietic system. Because of the presence of the large number of "Gaucher cells" in the bone marrow, there is a mechanical "forcing out" of the normal bone marrow cells. The result is anemia, leukopenia and thrombocytopenia, which are responsible not only for the bleeding tendency but for a generalized lowered resistance to infectious processes.

Gaucher's disease is not incompatible with life, and often treatment is not necessary because of the slow progress of the disease. In cases of pronounced enlargement of the spleen, radiation therapy is employed; splenectomy is rarely performed. When the facial bones are so involved that there is loss of osseous support for the teeth and resorption of the roots, it may be necessary to remove the teeth and curette the bone lesions. This procedure is usually followed by normal bone regeneration.

■ *Multiple Myeloma*

Multiple myeloma is a malignant tumor arising in the bone marrow, especially in sites where red marrow is ordinarily found. Any of the cells of the marrow may be affected, but in the majority of cases it is the plasma cells that are involved. It is a disorder of adult life, usually making its appearance after the age of 40. Men are affected about twice as frequently as women. It is a fatal disease, running its course in a period varying from several months to a few years.

Diagnosis of multiple myeloma is not difficult; it is based on a combination of clinical findings, skeletal involvement and alteration of the blood chemistry. Pain is common, usually starting in the chest and back and progressing down the spine. Anemia is usually present, probably caused by a change in the bone marrow due to the proliferating myeloma cells. Aside from anemia there is little change in the peripheral blood. There is generally weakness and a loss in weight. Pathological fractures sometimes occur, due to bone resorption caused by the proliferating tumor cells. Renal damage is frequent, caused by the disturbances of protein metabolism common in this disease.

The skeletal involvement presents a more or less characteristic picture. The osseous lesions may occur in any bone but usually occur in the spinal column, clavicles, sternum, ribs and skull. Early findings are multiple, small areas of bone destruction having sharp borders with no proliferative reaction at their margins. As the lesions become more numerous, they

coalesce, forming larger "punched out" irregular areas. As they increase in size, the cortex may be thinned and finally perforated, and the overlying soft tissue may become involved. These bone lesions consist of collections of the abnormal plasma cells which cause resorption and destruction of the bone (Fig. 4, above).

In the facial bones multiple myeloma is most frequently seen in the mandible, where the lesions follow a pattern similar to that described for other bones. The roentgenographic appearance of lesions appearing in the jaws is not diagnostic and when associated with teeth may be confused with odontogenic lesions. The lesions usually appear in the posterior regions of the mandible and tend to extend along and below the mandibular canal. The lesions also tend to extend toward the alveolar crest in edentulous areas[5] (Fig. 4, center left).

At least three abnormalities of protein metabolism which are of diagnostic significance are observed in this disease; namely, the excretion of Bence Jones protein in the urine; hyperproteinemia with increase of the globulin fraction; and deposition of amyloid in different organs.[11] The presence of Bence Jones protein is noted in the urine of about half the cases of multiple myeloma but only rarely in that of patients not suffering from the disease.[11] Hyperproteinemia and an increase of the globulin content of the serum accompanied by a reversal of the albumin-globulin ratio are observed in approximately 60 per cent of the cases. Hyperproteinemia is frequently present when Bence Jones protein is absent and vice versa. Thus, laboratory procedures to determine the status of the protein fractions of the blood as well as the presence of Bence Jones protein in the urine are important diagnostic aids. The third abnormality of protein metabolism is the deposition of amyloid in various organs and tissues; it occurs in approximately 7 per cent of the cases.[12] Amyloid is a protein abnormally deposited in various tissues as a result of some pathologic process. Two types of amyloidosis are recognized, the primary or idiopathic, for which the cause is unknown, and the secondary, which occurs with longstanding suppurations, tuberculosis, syphilis or similar diseases. The deposits of amyloid in secondary amyloidosis are present mainly in the liver, spleen, adrenal glands and kidneys, while in primary amyloidosis these organs are usually not involved but the deposits are noted in mesodermal tissues such as the tongue, subcutaneous tissues, heart, lungs, bones, and the smooth muscle bundles of the gastrointestinal and urinary tracts.[13] In multiple myeloma the deposition of the amyloid follows the pattern of the primary rather than of the secondary amyloidosis and consequently is noted occasionally in the oral cavity, involving the tongue, submental and submaxillary regions. The involved regions become greatly enlarged, have a firm boardlike consistency and are refractory to all known treatment. The tongue may become so enlarged that its mobility is greatly impaired and there is interference with speech, mastication and de-

11. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 245.

12. Anderson, W. A. D., editor. Pathology. St. Louis, C. V. Mosby Co., 1948, p. 79.

13. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 253.

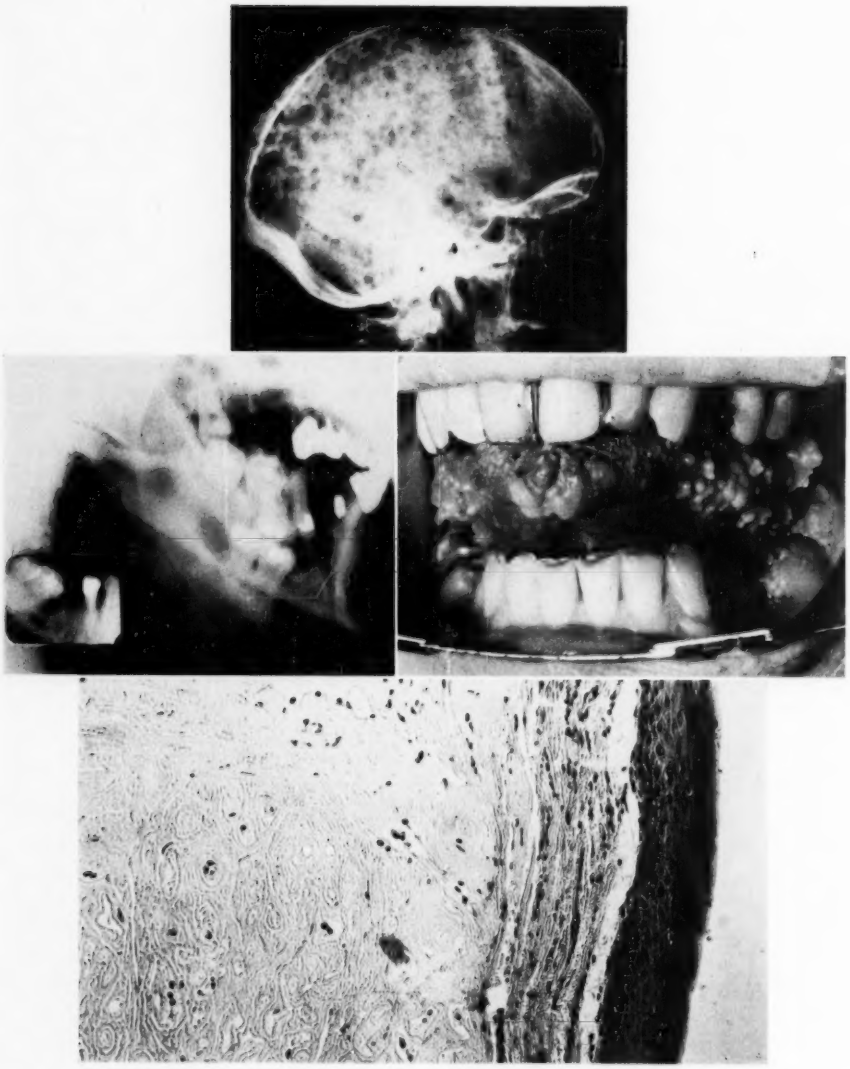

*Fig. 4—Above: Multiple myeloma involving skull. Center left: Multiple myeloma, first interpreted as area of residual infection. Note small "punched out" areas. Center right: Amyloid infiltration of tongue of same patient. Below: Replacement of muscle tissue of tongue by amyloid (same case)*

glutition (Fig. 4, center right). Diagnosis of amyloidosis is confirmed by biopsy (Fig. 4, below).

These disturbances of protein metabolism are responsible for the renal changes that frequently occur in myeloma. Renal failure is caused by the excretion of Bence Jones protein, which often precipitates in the renal tubules. This mechanical blocking of the tubules leads to uremia with high urea nitrogen, creatinine and phosphatase values of the blood.[14]

In certain cases of multiple myeloma there is an increase in the level of serum calcium. This is due to the rapid decalcification of the skeleton. While the serum calcium level is occasionally increased, the serum phosphorus and alkaline phosphatase levels are usually normal.

Final diagnosis of multiple myeloma is confirmed by studies of the bone marrow. The presence of the typical myeloma cell, resembling the plasma cell, is the characteristic finding.

Multiple myeloma is refractory to all types of treatment. Therapeutic efforts may result in temporary improvement, but the final outcome is always fatal. Any of the bone marrow depressants, such as roentgen rays, urethane, radioactive phosphorus, nitrogen mustard or stilbamidine, bring about remission; but the final outcome is the same. Needless to say, oral lesions of multiple myeloma should not be treated surgically. Pain in the oral region resulting from involvement of the facial bones can usually be controlled by small doses of roentgen rays.

### ■ *Hyperparathyroidism*

Hyperparathyroidism results from an increased production of parathyroid hormone and may produce characteristic changes in the skeletal system, many of which are observed in the facial bones. Two types of hyperparathyroidism are recognized: the primary, usually caused by an adenoma of the parathyroids and the secondary, which appears as a response to some other condition and results in hyperplasia of the parathyroids. Regardless of the type, the skeletal lesions are the same.

Von Recklinghausen described the malady in 1891 and emphasized the skeletal changes in the disease. The condition he described is now known as osteitis fibrosa cystica generalisata. In 1926 Mandel established the connection between the skeletal involvement and a parathyroid adenoma by effecting a cure through removal of an adenoma.[15] Until 1934 when Albright and others[16] called attention to the frequency with which renal changes and renal stones occurred with the disorder, it was believed that all cases of hyperparathyroidism were manifested by the skeletal changes. Albright was able to prove that from a standpoint both of incidence and hazard to life the renal involvement was of more serious consequence than skeletal lesions and that many cases occurred without skeletal involvement. Albright was convinced that the primary site of action of the parathyroid hormone was the kidney and not the skeleton. According to his reasoning,

14. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 240.

15. Keating, F. R., Jr. Hyperparathyroidism. Am. J. Orthodont. (Oral Surg. Sect.) 33:116 Feb. 1947.

16. Albright, F.; Aub, J. C., and Bauer, W. Hyperparathyroidism; common and polymorphic condition as illustrated by seventeen proved cases from one clinic. J.A.M.A. 102:1276 April 21, 1934.

an excess of parathyroid hormone first increases the excretion of phosphorus in the urine. This increase is followed by a decrease in the serum phosphorus, which in turn renders the serum less saturated with calcium phosphatase. This lowering of the serum calcium must be compensated for, either by absorption of additional calcium from the gastrointestinal tract or by withdrawal of calcium from the skeleton. If the calcium balance of the patient is positive and there are no factors to prevent absorption of calcium phosphatase through the gastrointestinal tract, the needed calcium phosphatase will be obtained from this source; and no skeletal involvement will be noted. If, on the other hand, the calcium balance of the patient is negative or the patient is unable to absorb calcium phosphatase through the gastrointestinal tract, the needed calcium phosphatase will be taken from the skeleton; and osseous lesions will result. The addition of calcium phosphatase increases the level of serum calcium and results in hypercalcemia, which is associated with this disorder.

When the skeleton is involved, the clinical observations vary with the degree of involvement. Vague pains, bone tenderness, decreased stature, pathologic fractures, pigeon breast and other deformities as well as cysts and tumors are observed. Roentgenograms show a generalized skeletal decalcification. This demineralization is not always equally distributed; it may be more pronounced in the extremities, skull and jaws.

When the facial bones are involved, characteristic changes take place. Albright and Reifenstein[17] state: "It is often helpful to know whether or not the lamina dura is still visible around the teeth. If it is not, the inference is that generalized decalcification is present." In addition to the loss of the lamina dura, the normal architecture of the bone is changed; and the usual arrangement of trabeculae is replaced by a fine, granular "ground glass" osteoporosis. The teeth fail to show any decalcification and therefore are in striking contrast with the decalcified maxilla and mandible. There may be regions of bone destruction which have been replaced by tumors or cystlike lesions. These lesions appear as cysts in the roentgenogram although they are not true cysts but are osteoclastomas or regions of fibrosis. Because of the rapid resorption of the supporting bone, the teeth often become loose and mobile, and malocclusion may result.[5]

There are definite biochemical changes associated with hyperparathyroidism which are diagnostic. There is an increase in the calcium and a decrease in the phosphorus in the blood; there is an increase in urinary excretion of both calcium and phosphorus; and when bone lesions are present, there is an increase in the serum alkaline phosphatase.[15] Without these biochemical changes a diagnosis of hyperparathyroidism is not justified.

Treatment of hyperparathyroidism consists of removal of the cause: in the case of primary hyperparathyroidism, surgical removal of the adenoma; in the case of secondary hyperparathyroidism, the correction of the associated condition, if possible. After successful treatment there is a decided change in the bone. Bone in which destruction is not too far advanced

17. Albright, F., and Reifenstein, E. C., Jr. The parathyroid glands and metabolic bone disease: selected studies. Baltimore, Williams & Wilkins Co., 1948, p. 57.

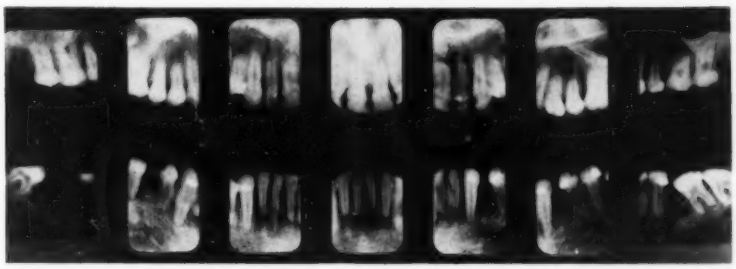

*Fig. 5—Hypothyroidism. Note normal crowns and "blunting" of root ends of numerous teeth*

will return to normal. Bone in which destruction is far advanced will be repaired by deposition of a dense sclerotic osseous substance.

Local treatment for the oral lesions is not indicated. When an undiagnosed local cystic lesion is operated on and a typical osteoclastoma or benign giant cell tumor is encountered, a complete examination to rule out the possibility of hyperparathyroidism is indicated.

■ *Hypothyroidism*

Certain changes in the oral structures are noted in hypothyroidism. The thyroid gland secretes a hormone, thyroxin, which regulates the basal metabolism rate and has an effect on growth and development. In hypothyroidism there is a retardation of growth, the extent of which is dependent on the time of onset and degree of lack of the hormone. Three types are recognized: infantile myxedema resulting from prenatal changes; juvenile myxedema, due to the onset of the condition between the sixth and twelfth years; and adult myxedema, due to hypothyroidism acquired in adulthood by a formerly normal person.[18]

In infantile myxedema the jaws are small and underdeveloped, the exfoliation of the deciduous teeth is delayed, and eruption of the permanent teeth is retarded. In juvenile myxedema various stages of underdevelopment of the roots of the teeth may be noted (Fig. 5). The roots have the appearance of resorption similar to that resulting from rapid movement of teeth during orthodontic treatment. The crowns of the teeth are normal. In adult myxedema there are no changes associated with the teeth, as the condition has its onset after odontogenesis is complete.

Clinical signs such as edema, inability to tolerate cold, mental sluggishness, cold clammy skin, changes in the skeleton and teeth are observed in varying degrees in this disorder. Hypothyroidism should be suspected if the dental roentgenograms reveal teeth with normal crowns and underdeveloped roots when there has been no history of orthodontic treatment.

Two laboratory determinations provide valuable aid in diagnosis of this con-

18. Thoma, K. Oral pathology. St. Louis, C. V. Mosby Co., 1950, p. 702.

dition. A pronounced rise in the level of the serum cholesterol and a decrease in the basal metabolic rate are constant findings in this disorder.

Treatment is in the province of the internist or pediatrician and consists of administration of thyroid extract. No local oral treatment is indicated.

■ *Paget's Disease*

Paget's disease is a disease of unknown origin affecting the skeleton, occurring usually after the age of 40. It may be limited to one bone, or many bones may be involved. It is not a generalized disease like the skeletal involvement in hyperparathyroidism, for the bones that are not involved are entirely normal. It is usually characterized by a gradually enlarging skull, shortening of the extremities and curving of the spine. There is both increased destruction and increased formation of the osseous tissues, but the formation of new bone exceeds bone destruction with resulting increased thickness of the bone. Resorption of the new bone before calcification is complete results in the so-called "cotton wool" structure of the bone, which is found in practically no other disease. This change is particularly noticeable in the skull. The changes in the long bones which can be observed in a roentgenogram are a thickening and broadening of the cortex, modification of the structure of the cortex, increased transparency and curving of the bone.[19]

When the facial bones are involved, the maxilla is the site of the disturbance more often than the mandible. In fact, the maxilla often shows changes before symptoms appear in the rest of the body. There is generally a thickening and bulging of the involved bone. Roentgenograms show a change in the calcification and trabecular pattern of the bone, the normal structure being replaced by areas of sclerosis and decalcification and occasionally presenting a miliary "ground glass" appearance. In advanced cases, a poorly differentiated hyperplastic cementum may form on the roots of teeth in the involved areas. This abnormal hypercementosis is characteristic of Paget's disease and may be used as a point in differential diagnosis.

Blood chemistry findings are significant. The calcium and phosphorus content of the blood is usually normal, and the urinary output of both calcium and phosphorus is within normal limits. The alkaline phosphatase content of the blood is considerably increased, rising as high as 135 Bodansky units. When only one bone is involved, the alkaline phosphatase content may be normal.

There are many complications associated with Paget's disease. The vascularity of the bone or bones involved in this disturbance is greatly increased. Edholm, Howarth and McMichael[20] were able to measure the flow of blood through bones affected by Paget's disease and noted that it was 20 times as high as normal. This increased vascularity leads to a hyperemia of the involved bone, an observation noted by Paget in his original article. Skin temperatures over bones affected with the disease are from 1.5°C. to 3.8°C. higher

19. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 160.

20. Edholm, O. G.; Howarth, S., and McMichael, J. Heart failure and bone blood flow in osteitis deformans. Clin. Sc. 5:249 Dec. 1945.

than that of normal skin. The high incidence of osteogenic sarcoma in bones affected by Paget's disease is of interest. It has been stated that of the patients over 50 who have osteogenic sarcoma, 25 per cent have a coexistent Paget's disease. Sarcomas of the skull observed in patients of this age group have been found only in skulls affected by Paget's disease.[21]

The clinical course varies. Some patients have relatively few complaints; others have various symptoms: bone pain, pathological fractures, rheumatoid pains, deafness, renal stones, cardiac failure and sarcoma. Paget's disease in itself does not endanger life, and many patients with the disease reach an old age. The patient usually dies of one of the complications of the disease.

Little treatment is indicated for the oral conditions. When removal of the teeth is indicated, the enlarged bones may be reduced by surgical intervention to the extent that dentures can be constructed. The operation may need to be repeated from time to time as the disease progresses.

### ■ *Cooley's Anemia*

Cooley's anemia, or primary erythroblastic anemia, is a congenital disorder, affecting the erythroblastic tissues, that produces characteristic changes in the skeleton. It is observed mostly in children of Greeks, Italians and Syrians (races which border on the Mediterranean Sea). It usually becomes manifest before the second year of life. Clinically the patients are weak, lethargic and mentally sluggish, and have an extreme pallor with a yellowish tint to the skin and pronounced enlargement of the spleen and liver. There is considerable activity of the bone marrow which results in osteoporosis. Roentgenograms reveal osteoporosis, with a widening of the medullary space and a thinning of the cortex.

There are many oral aspects of the disease. The maxilla and mandible may be involved in the generalized osteoporosis, and the characteristic changes may be evident in the dental roentgenograms. Widening of the marrow cavity, thinning of the cortex, destruction of the cancellous portion of the bone and crossing of the marrow spaces by irregular, narrow, distorted trabeculae are significant roentgenographic findings. The patient acquires a characteristic mongoloid appearance with prominent frontal and parietal bosses, overdeveloped maxilla and malar bones in conjunction with a short nose and depressed bridge. The premaxilla is prominent, with well-developed teeth. There may be an obliteration of the maxillary sinuses. The overdevelopment of the maxilla results in a malocclusion with open bite and spacing of the teeth.

In advanced cases characteristic changes occur in the skull. The tables of the skull are thinned; but a thickening of the diploic space occurs, with a resultant increase in the over-all thickness of the skull. Bone trabeculae form which run at right angles to the table and often perforate and extend beyond the outer table. The result is a coarse, vertical striation outside the outer table, which in the roentgenogram gives the appearance of calcified hairs standing on end.

Osseous changes are characteristic also of the other types of hemolytic ane-

21. Snapper, I. Medical clinics on bone diseases: a text and atlas, ed. 2. New York, Interscience Publishers, Inc., 1949, p. 171.

mia, namely, sickle cell anemia and hereditary hemolytic anemia; but they are not as striking as the changes observed in Cooley's anemia.

The hematologic findings are characteristic. The color index is low. Many immature red blood cells, varying widely in size and shape, are observed in the peripheral circulation. The condition is sometimes called "target cell anemia" because large erythrocytes with a round center of hemoglobin surrounded by a clear ring are observed occasionally.[22]

There is no treatment for the oral condition. Treatment of the disease, which is in the province of the internist, is unsatisfactory; and the prognosis is poor. There are periods of remission, and some patients survive to adult life. Individuals thus affected are susceptible to infections and usually die of some concurrent infectious process.

■ *Ectodermal Dysplasia*

Ectodermal dysplasia is a disorder of hereditary tendency characterized by the presence of only a few teeth (oligodontia) or complete absence of teeth (anodontia), sparse hair or total absence of hair (hypotrichosis) and an abnormal deficiency of sweat glands (anhidrosis). Associated manifestations of this disorder are abnormalities of the nails and skin; deficiencies of the lacrimal, conjunctival, pharyngeal and salivary glands; and certain facial changes.[23] The facial characteristics of patients with this disorder are strikingly similar; they include a saddle nose; bulging frontal prominences; pointed ears; soft, thin, dry skin; and hair that is sparse and thin.[24] Because of the diminished number or absence of sweat glands, many of the individuals with this disorder have an intolerance to heat.

It is believed that the partial or complete lack of teeth is caused by a suppression of the development of ectodermal tissues. In its most severe form this condition results in aplasia of the dental lamina and complete absence of tooth development. If the ectodermal development is not completely arrested, the dental lamina may form and produce the enamel organs for the deciduous teeth; but in this process the entire genetic force of the dental lamina is expended, and the permanent teeth fail to form. In other cases the aplasia of the dental lamina is incomplete so that deciduous teeth are formed in various locations and are succeeded by the permanent teeth if there is sufficient genetic force (Fig. 6, above).

Thoma[25] describes a variation of this disorder in which there is a retention of the lanugo hair and formation and retention of the deciduous teeth. In this type it is believed that the embryonic hair and deciduous teeth form and are retained permanently because the disorder has its onset after these structures are formed. The permanent teeth and secondary hair do not form because of the disorder, but the deciduous teeth (Fig. 6, below) and lanugo hair having been formed prior to the onset of the disturbance are not affected.

22. Burket, Lester W. Oral medicine: diagnosis, treatment Philadelphia, J. P. Lippincott Co., 1946, p. 461.

23. Teutsch, L. W., and Hartsook, J. T. Ectodermal dysplasia, anhidrotic type: report of a case. J.A.D.A. 37:636 Dec. 1948.

24. Everett, F. G., and others. Anhidrotic ectodermal dysplasia with anodontia, a study of two families. J.A.D.A. 44:173 Feb. 1952.

25. Thoma, K. Oral pathology. St. Louis, C. V. Mosby Co., 1950, p. 172.

Dental treatment for this disorder generally consists of prosthetic replacement of the missing teeth. It is evident that the appliances must be adjusted and remade frequently as the patient grows older. The disorder is not incompatible with life; and hyperthermia, associated with anhidrosis, becomes less bothersome as the individual learns to live with the affliction.[24]

■ *Metastatic Malignant Tumors*

The skeleton is a frequent site of metastasized malignant tumors, and the facial bones are occasionally involved in this process. Carcinomas arising in the lip, tongue, floor of the mouth, prostate, breast, kidney, stomach, lungs and thyroid with metastasis to the facial bones have been reported as well as neuroblastomas associated with the adrenal glands. Primary tumors of bone also on rare occasion metastasize to the facial bones. With the exception of malignancies of the oral cavity, the metastatic emboli generally reach the jaws by way of the lymphatics or the blood stream. While malignancies of the oral cavity may invade the mandible or maxilla by these pathways, they may also invade these bones by direct extension of the tumor (Fig. 7).

Clinical evidence of metastasis to the facial bones is usually a late event in the course of the disease, but occasionally it is the oral symptoms that lead to the discovery of the disease. Swelling, pain, paresthesia, loosening of the teeth and involvement of the overlying soft tissues are the usual symptoms when the mandible or maxilla is involved. Roentgenograms

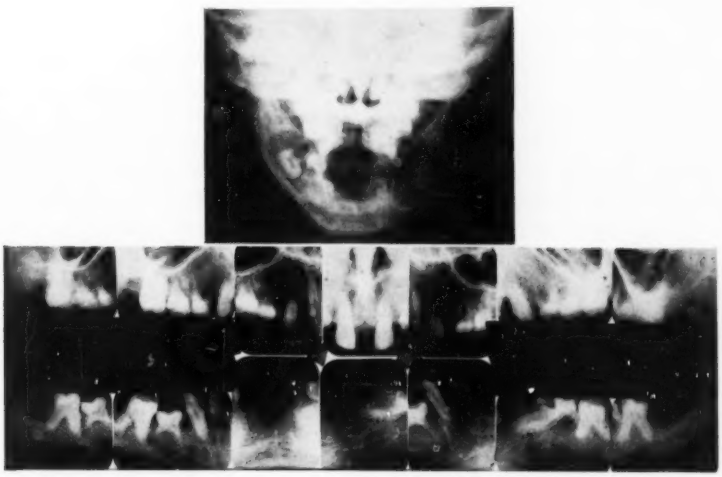

*Fig. 6—Above: Oligodontia associated with ectodermal dysplasia. Below: Ectodermal dysplasia; entire genetic force of dental lamina apparently expended in formation of deciduous teeth and a few permanent teeth*

*Fig. 7—Carcinoma of tongue and floor of mouth involving mandible by direct extension*

usually reveal an osteolytic lesion, showing varying degrees of bone destruction with little or no evidence of bone regeneration. The exception to this observation may be seen in carcinoma of the prostate, which on occasion produces an osteoblastic metastatic lesion.

■ *Cleidocranial Dysostosis*

Cleidocranial dysostosis is a congenital disorder manifested by changes in the membranous bones and abnormalities of the skull, facial bones and clavicles. The skull is short and broad with accentuation of the frontal and parietal eminences. There may be delayed ossification of the fontanels and delayed closure of the cranial sutures. The maxilla is underdeveloped, and the nose is usually broad with a depressed bridge. The maxillary sinuses are small or completely absent. There is retention of the deciduous teeth and noneruption of the permanent teeth. Generally there are numerous unerupted supernumerary teeth, usually located in the bicuspid regions. Permanent teeth which do not have a preceding deciduous tooth usually erupt normally. The clavicles may show all degrees of maldevelopment ranging from their complete absence to faulty calcification of the extremities of the bone. Individuals with defects of the clavicles show unusual mobility of the shoulders, being able to bring them together at the midline. Deformities of the thoracic cavity and a contracted or deformed pelvis may be additional skeletal symptoms. There is a definite hereditary pattern for the disorder, although sporadic cases do occur.

Stafne[5] is of the opinion that the failure of the deciduous teeth to exfoliate and the permanent teeth to erupt is probably due to the character of the bone. The bone may be unable to resorb the roots of the deciduous teeth, and it fails also to resorb in response to the eruptive force of the permanent teeth.

Treatment of this condition presents a problem. The extraction of the retained deciduous teeth does not preclude the eruption of the permanent teeth. Burket[26] believes every effort should be made to restore and retain the erupted teeth and to construct prosthetic appliances as indicated. If all the erupted teeth are beyond repair, he suggests they should be removed and dentures constructed over the unerupted teeth. If and when the unerupted teeth make their appearance at a subsequent time, they can then be extracted. Seldin and others[27] believe that in selected cases all the erupted and unerupted teeth should be removed to preclude the necessity for repeated operations for removal of teeth as they appear with

26. Burket, Lester W. Oral medicine; diagnosis, treatment. Philadelphia, J. P. Lippincott Co., 1946, p. 336.

27. Seldin, H. M.; Seldin, S. D., and Rakower, William. Cleidocranial dysostosis. J. Oral Surg. 8:236 July 1950.

subsequent refitting of the dentures. This procedure should be considered carefully and not undertaken if removal of the unerupted teeth will result in such mutilation of the alveolar ridges that denture construction will be unsatisfactory.

### ■ *Crouzon's Disease—Craniofacial Dysostosis*

Craniofacial dysostosis is a rare deformity produced by premature synostosis of certain craniofacial sutures which causes specific changes in the skull and facial bones. It follows a hereditary pattern with the majority of cases showing the condition as a developed dominant character,[28] although many cases of the so-called sporadic type have been reported.[29]

In this condition the cranial sutures are closed prematurely, forming an unyielding bony case. As the brain grows normally—it doubles its size at the end of the first seven months and triples in size at the end of two and a half years[30]—an increasing intracranial pressure is rapidly developed. This results in characteristic changes in the skull. Depending on which cranial sutures are closed, varying degrees of scaphocephaly, brachycephaly or acrocephaly develop along with prominent frontal and parietal protuberances. The increased pressure depresses the roof of the orbit so that it slopes abnormally downward in a more vertical direction and the orbit is shortened. This abnormality forces the orbital contents forward and creates a conspicuous exophthalmos (Fig. 8, left).

The facial changes are due to premature synostosis of the maxilla, zygoma, great wing of the sphenoid, temporal, pterygoid and palatine bones. This condition results in hypoplasia of the middle third of the face with underdevelopment of the maxilla and orbits. It results further in a locking of the orbits in the widely separated, laterally directed fetal position, with increased interocular distance.

Oral changes are caused by hypoplasia of the maxilla. A relative prognathism develops resulting from the normal growth of the mandible, which is not involved in the disorder, while the growth of the maxilla is arrested. Because of the discrepancy in rate of growth of the two bones, the resulting malocclusion and prognathism become more pronounced as the child matures.

Roentgenograms show premature closure of various cranial suture lines. The relative prognathism is evident, but the most striking finding in the roentgenograms is the erosion of the inner plate of the cranium. The convolutional markings of the brain are visualized as they have been eroded into the bone by the constantly increasing intracranial pressure (Fig. 8, right). On rare occasions complete perforation of the skull occurs.

The disorder is present at birth, but it may be some time before it becomes evident. Patients with the disorder have clinical symptoms associated with increased intracranial pressure, which varies with the severity of the disorder. Prognathism, exophthalmia, increased interocular distance, headaches, convulsions and at-

28. Lake, M. S., and Kuppinger, J. C. Craniofacial dysostosis (Crouzon's disease); report of 3 cases. Arch. Ophth. 44:37 July 1950.

29. Flippen, J. H., Jr. Craniofacial dysostosis of Crouzon; report of case in which malformation occurred in 4 generations. Pediatrics 5:90 Jan. 1950.

30. Faber, H. K., and Towne, E. B. Early craniectomy as preventive measure in oxycephaly and allied conditions with special reference to prevention of blindness. Am. J.M.Sc. 173:701 May 1927.

rophy of the optic nerves with resulting blindness may be observed.

The cause of the premature synostosis is unknown. Normally, continuous growth of the interstitial mesenchymal tissue between the bony margins of the centers of ossification prevents obliteration of the sutures. In the normal skull, loss of the sutures of the cranial vault by synostosis usually begins at about the age of 40; the sutures do not close completely until advanced age. When premature synostosis does occur, the condition seems to be due to a defect in the germ plasm, producing abnormalities in the interstitial mesenchymal tissue, rather than to disturbances in the centers of ossification.[28]

Treatment of cranial stenosis is in the province of the neurosurgeon and consists of opening the synostosed suture lines and interposing an inert material such as polyethylene. This procedure allows for expansion of the growing brain and prevents reossification of the sutures. If the disorder is diagnosed early, corrective surgical measures may prevent the deformities of the skull; but no treatment to prevent the facial deformities has been suggested. Treatment of the facial deformities after they develop is unsatisfactory. Orthodontic treatment and possibly osteotomy may be considered after the mandible has reached its full development.

There are cases of cranial stenosis without changes in the face. Premature

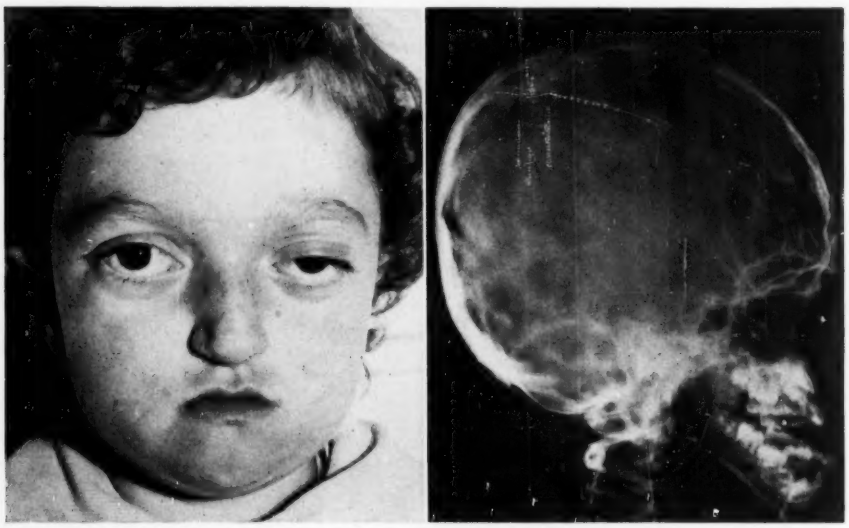

*Fig. 8—Crouzon's disease—cranial facial dysostosis: Left: Note exophthalmos, increased interocular distance and pronounced prognathism caused by underdevelopment of maxilla. Right: Malformation and erosion of bone brought about by increased intracranial pressure after premature closure of suture lines. Note pronounced prognathism*

closure of any of the cranial sutures may occur without involvement of the facial bones. Thus, it is possible to have scaphocephaly, brachycephaly or acrocephaly without craniofacial dysostosis. On the other hand, craniofacial dysostosis may be associated with any of the disorders mentioned. The hereditary pattern is much more evident in craniofacial dysostosis than in other forms of cranial stenosis.

### ■ *Odontogenesis Imperfecta—Dentinogenesis Imperfecta*

Odontogenesis imperfecta is a congenital disorder which occurs frequently in connection with osteogenesis imperfecta but occasionally occurs without the generalized involvement of the osseous structures. Characteristic changes in the teeth are observed in this disorder, which is probably caused by a developmental disturbance of the tissues from which the teeth are formed. If the ectoderm is involved, there will be changes in the enamel; if the mesoderm is involved, there will be disturbances in the dentin and the cementum.

Thoma[31] recognizes two forms of odontogenesis imperfecta, amelogenesis imperfecta and dentinogenesis imperfecta, affecting different parts of the tooth. This discussion is limited to the changes occurring in dentinogenesis imperfecta. The changes result from hypoplasia or aplasia of the mesenchymal tissue from which the dentin and cementum form. It is manifested clinically by disturbances of the roots of the teeth while the crowns remain normal. The roots show varying degrees of formation, ranging from complete absence to more or less normal shape and size. When the roots are formed, they are tapering and for the most part completely calcified. The pulp chambers and canals are obliterated by calcification of a dentinal substance (Fig. 9, above).

In the cases which have been reported,[32-34] attention is called to the peculiar dark bluish gray color of the crowns of the teeth and the pronounced abrasion of the enamel; however, cases with the roentgenographic and histologic findings characteristic of this disease have been seen in which the crowns and enamel were entirely normal with no apparent abnormalities in color, shape or form (Fig. 9, below).

Patients often complain either of spontaneous fractures or loosening and exfoliation of the teeth. This is due to the abnormal root formation, which affords inadequate support. In other cases there appears to be a spontaneous separation of the normal crown from the hypoplastic dentin. There is frequent occurrence of cysts with hypoplastic roots. The cysts have the roentgenographic and microscopic appearance of radicular cysts and undoubtedly are due to disturbances during odontogenesis. On other occasions the hypoplastic teeth fail to erupt and may be associated with cystic formation that is follicular in character.

Wilson and Steinbrecher[32] report the hereditary pattern of this disturbance, and their findings are confirmed by Roberts and Schour.[33] The latter authors

31. Thoma, K. Oral pathology. St. Louis, C. V. Mosby Co., 1950, p. 265.

32. Wilson, G. W., and Steinbrecher, M. Hereditary hypoplasia of the dentin. J.A.D.A. 16:866 May 1929.

33. Roberts, E., and Schour, I. Hereditary opalescent dentine (dentinogenesis imperfecta). Am. J. Orthodont. 25:267 March 1939.

34. Noyes, F. B. Hereditary anomaly in structure of dentin. (Abst.) J. D. Res. 15:154 June-Aug. 1935.

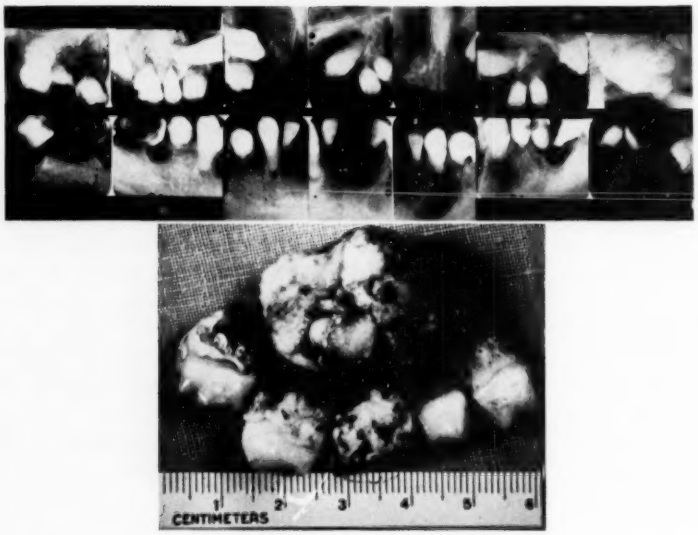


*Fig. 9—Dentinogenesis imperfecta—mesodermal aplasia. Above: Deformities of roots of teeth and complete obliteration of pulp canals. Note crowns, normal in shape and color, and multiple follicular and radicular cysts. Below: Gross specimen of teeth and cysts removed from upper left quadrant. Note extreme deformity, lack of root development and normal crowns*

state that the condition does not occur in children unless it is visible in one of the parents; it is therefore a dominant character with a ratio of 1:1 to be expected in the offspring.

Histological examination shows a normal enamel, absence of the pulp cavity and pronounced distortion of the dentin. The dentin for the most part appears as an amorphous matrix in which many lacunae are present. There is an irregular arrangement of tubuli, and the number of tubuli is smaller than normal. Occasionally tubuli of large diameter and with many treelike branchings are observed. The pulp cavity is filled with atypical hypoplastic material.

Chemical analysis of the blood of patients with dentinogenesis imperfecta without osteogenesis imperfecta shows normal results and is of no value in establishing the diagnosis.

Treatment depends on the individual case. If there is sufficient root formation to form stable attachment for the teeth, no treatment is indicated. In cases of fracture of the teeth, loosening due to insufficient attachment or associated cyst formation, surgical removal of the involved teeth is indicated.

## ■ *Conclusion*

Many systemic disorders may cause changes in the facial bones.

Although the diagnosis and treatment of many of these disturbances are definitely out of their province, the dentist and the oral surgeon should be aware of the possibility of these abnormal conditions and be able to recognize the more common forms. They should be able to decide whether or not the disturbance is of odontogenic or of local origin and should have a knowledge of the proper procedures to follow in arriving at a correct diagnosis.

# Use of oxytetracycline hydrochloride (Terramycin) in oral infections: a preliminary report

■ *George E. Morin, D.D.S., Claremont, N. H., and Irving G. Nathanson, D.D.S., Boston*

Oxytetracycline was isolated in 1950 from an actinomycete, *Streptomyces rimosis*. It is an antibiotic of outstanding promise with an extremely wide effective range. It is bacteriostatic in its action and has been used with good results against most gram-positive and gram-negative bacteria. It has been effective also against spirochetes, rickettsiae, protozoa, fungi and some viral organisms.

Clinical and experimental evidence indicates that oxytetracycline has a low toxicity.[1-4] Side reactions do occur, but these are mainly gastrointestinal upsets and mild diarrhea. These effects can be avoided in many cases by dividing the daily dosage into small doses and by the administration of oxytetracycline with cold milk. Allergic reactions have been observed but are extremely rare.

Oxytetracycline is rapidly absorbed from the gastrointestinal tract. A single oral dose of 2 Gm. can be detected in human serum in 30 minutes, and maximum levels are usually attained within

Formerly residents in oral surgery, Boston City Hospital.

1. Hobby, G. L., and others. Antimicrobial action of terramycin in vitro and in vivo. Proc. Soc. Exper. Biol. & Med. 73:503 March 1950.

2. Schoenbach, E. B.; Bryer, M. S., and Long, P. H. The pharmacology of terramycin in animals and man with reference to its clinical trial. Ann. New York Acad. Sc. 53: 245 Sept. 15, 1950.

3. P'an, S. Y., and others. The pharmacology of terramycin. J. Pharmacol. & Exper. Therap. 99:234 June 1950.

4. P'an S. Y.; Scaduto, L., and Cullen, M. Pharmacology of terramycin in experimental animals. Ann. New York Acad. Sc. 53:238 Sept. 15, 1950.

two hours.[4-7] Significant blood levels are maintained for 6 to 8 hours after oral administrations.[5-7]

When oxytetracycline was first introduced and the dosage schedules were under study, the dosage established was 2 Gm. per day. Since then, clinical experience has demonstrated that for the average case of infection 1 Gm. per day is adequate, with the dosage increased according to the severity of the infection. The total daily dose is administered in divided doses at 4 or 6 hour intervals.

At the Boston City Hospital oxytetracycline is used in the following dosage forms: oral, intravenous and topical administrations with capsules, oral drops, intravenous vials, ointment, cones, paste and troches.

The use of this antibiotic in the oral surgery department of the Boston City Hospital has been limited in most instances to patients who have not received penicillin or any other antibiotic prior to the administration of oxytetracycline. Only cases in which oxytetracycline was used are included in this report. Oxytetracycline has been administered prophylactically in several instances but not in a sufficient number of cases to warrant recording at this time.

The number of patients receiving this antibiotic, arranged according to condition treated, was as follows:

| *Condition* | *Cases* |
|---|---|
| Acute alveolar abscesses (patient hospitalized) | 16 |
| Acute alveolar abscesses (patient not hospitalized) | 35 |
| Vincent's infection | 28 |
| Dry socket | 10 |
| Fractures | 1 |

■ *Acute Alveolar Abscesses (Patient Hospitalized)*

All patients with acute alveolar abscesses had large indurated swellings, trismus and temperatures ranging from 100° F. to 102.4° F. All were placed on a regime consisting of bed rest, enema, catharsis, forced fluids, moist heat extraorally and warm saline rinses intraorally. Oxytetracycline was administered in doses of 2 Gm. per day for 48 hours and 1 Gm. per day thereafter in divided doses at 6 hour intervals. In all cases there was remarkable improvement after 24 hours; the temperature was normal after 36 hours; there was a notable resolution of the swelling and alleviation of the trismus after 48 hours. In all cases therapy could be discontinued on the fourth to the sixth day. In none of these cases was it necessary to resort to extraoral incision and drainage. In all cases the offending tooth was removed on the first day.

■ *Acute Alveolar Abscesses (Patient Not Hospitalized)*

Thirty-five cases of alveolar abscess with moderate swelling and trismus were treated on an outpatient basis with 1 Gm. of oxytetracycline daily in divided doses. Impressive results were noted in all cases, with resolution of swelling, alleviation of trismus and discontinuance of therapy in from 3 to 6 days.

5. Welch, H., and others. Comparative studies on terramycin and aureomycin: antibacterial spectrum, serum concentrations and urinary excretion. J. Am. Pharm. A. (Scient. Ed.) 39:185 April 1950.

6. Welch, H. Absorption, excretion, and distribution of terramycin. Ann. New York Acad. Sc. 53:253 Sept. 15, 1950.

7. Werner, C. A.; Knight, V., and McDermott, W. Absorption and excretion of terramycin in humans: comparison with aureomycin and chloramphenicol. Proc. Soc. Exper. Biol. & Med. 74:261 June 1950.

■ *Vincent's Infection*

Twenty-eight cases of Vincent's infection were treated with oxytetracycline troches at three hour intervals, supplemented by 1 Gm. of oxytetracycline daily administered systemically. In all cases, acute symptoms were relieved in from 24 to 48 hours. Oxytetracycline therapy was supplemented by saline mouth rinses.

■ *Dry Socket*

Ten cases of dry socket were treated with oxytetracycline paste. Therapy consisted of packing the socket with a plain gauze strip impregnated with oxytetracycline paste. This was supplemented by 1 Gm. of oxytetracycline daily administered systemically. Dressings were changed daily for 3 to 5 days. In no case was it necessary to continue therapy beyond the fifth day.

■ *Fracture*

Oxytetracycline elixir was used in one case of fracture. In this instance administration of oxytetracycline had to be discontinued because of diarrhea and vomiting on the third day of therapy.

■ *Summary and Conclusions*

1. Oxytetracycline is rapidly absorbed from the gastrointestinal tract, and therefore oral administration is effective.

2. Significant blood levels are attained within 2 hours and maintained for 6 to 8 hours after the administration of a single dose.

3. Although oxytetracycline has a low toxicity, it can cause diarrhea and gastrointestinal upset. In this series of cases 3 patients manifested symptoms of mild diarrhea; however, all occurred with the use of the elixir and none with the capsules.

4. In a series of 90 cases oxytetracycline has shown itself to be an extremely effective agent in the treatment of oral infections.—22 *Chase St.*

■ Function of Education

The highest function of education is to make human experience contemporary; that is, to make it available for use in the life of a man or a nation. Yet a great body of scholarship remains antiquarian, and many scholars withdraw into a grammarian's funk hole, because this is safer than to deal with the great issues of the age. As a result society is the poorer for want of the wisdom and the understanding that can only come from scholarship.—*Cornelis W. de Kiewiet, "Education for Survival," The Scientific Monthly 76:61 February 1953.*

# Maxillary nerve block via the pterygopalatine canal

■ *Hubert W. Merchant, D.D.S.**

Many dentists experiment with different types of local anesthetic solutions which contain various anesthetic agents and vasoconstrictors in the hope of finding a perfect local anesthetic which will solve all of the many problems of local anesthesia. Any attempt to improve the dental profession's service to the patient is commendable. The basic principles of anatomy and the proper technic of administration should be constantly reviewed and emphasized, however, in order to prevent possible carelessness or overemphasis on any one facet of the problem.

Local anesthesia is a boon to the dental profession and to the patient. The use of local anesthesia in dentistry has increased tremendously in recent years and undoubtedly will continue to do so.

There are many indications and contraindications for the use of a local anesthetic; the decision should rest with the operator at all times. Often the presence of infection is an indication for a general anesthetic, but a knowledge of basic anatomy might, on many occasions, make this a questionable procedure. Selection of anesthesia has been covered by many authors, hence will not be covered in this paper. Needless to say, local anesthesia is used by more dentists for all types of dental operations, from scaling and filling operations to major oral surgery, than general anesthesia.

As a previous article on this subject stated,[1] literature on the pterygopalatine injection for maxillary nerve block is conspicuous by its scarcity. Szerlip found approximately 16 references and I have found only four more,[1-4] two of which were by Szerlip.

The pterygopalatine canal is formed by the maxilla and palate bones and transmits the anterior palatine vessels and nerves through the posterior, or greater palatine, foramen to the soft tissues of the palate. The greater palatine foramen is located in the vicinity of the second or third maxillary molar, about one third of the distance from the border of the alveolar process to the midline. The superior end of the canal opens into the pterygomaxillary (or sphenopalatine) fossa. In the pterygomaxillary fossa are the maxillary nerve, the sphenopalatine ganglion and the internal maxillary artery.

In discussion of this region in connection with local anesthesia, the question arises as to the possibility of entering the cranial fossa through the fissures and

*Major, Dental Corps, U. S. Army, Berlin Command, Office of the Dental Surgeon. APO 742, c/o Postmaster, New York.

1. Szerlip, L. Pterygopalatine injection for blocking of the maxillary nerve. J. Oral Surg. 6:135 April 1948.

2. Szerlip, L. Roentgenographic study of the pterygopalatine injection for blocking maxillary nerve. J. Oral Surg. 8:327 Oct. 1950.

3. Nevin, M. Success with the second division injection. D. Items Interest 72:1041 Oct. 1950.

4. Cook, W. A. Second division block via the pterygopalatine canal. D. Items Interest 72:1270 Dec. 1950.

**Table**

**Area of anesthesia obtained and side effects in 365 injections made via pterygopalatine canal**

| | | |
|---|---|---|
| Attempted anesthesia | 365 | |
| Successful penetration of canal | 355 | |
| Anesthesia | | |
| Posterior superior alveolar | 343 | (96.6%) |
| Posterior and middle | 334 | (94.0%) |
| Posterior middle and anterior | 294 | (82.8%) |
| Diplopia | 60 | (16.9%) |
| Faintness | 5 | |
| Partial third division anesthesia | 7 | |
| Partial first division anesthesia | 3 | |

foramens which open into the pterygopalatine canal. Entrance through foramens or fissures located more than 2 or 3 mm. medial or lateral to the canal may be automatically eliminated from consideration as being a physical impossibility. This eliminates the pterygoid and pharyngeal canals, penetration of which would be impossible or insignificant. The infratemporal fossa is lateral and external to the cranial cavity. Needle penetration toward the area of the foramen rotundum would strike the maxillary nerve and consequently a warning would be given through the sensation of sharp pain followed by immediate anesthesia, if the operator is injecting ahead of the needle as is generally advised. Actually, the only possible entrance to the cranial fossa that is of significance is the superior orbital fissure which transmits the ophthalmic, oculomotor, trochlear and abducens nerves, branches from the sympathetic plexus and two small arteries.

Through the courtesy of the University of Georgia Medical College, 100 pterygopalatine canals were made available for study. In 96 of the 100, the needle penetrated medial to the foramen rotundum and in three canals, lateral. One centered on the foramen rotundum. Only two were found in which there could be a question of penetration through the superior orbital fissure, unless there was a wide deviation from the technic to be described and unless there was a disregard of the sense of touch which indicates bony resistance. Study of these canals indicates an extremely remote possibility of injuring structures in the orbit. The observations made during 365 injections reported here (see table) confirms this. It could be theoretically possible if the angle of injection were increased toward 90 degrees, but fortunately this possibility is limited by the degree to which the patient can open his mouth. As for the optic nerve, it might be possible to contact it by continuing to force a fine needle (26 or 28 gauge) beyond the point of bony contact on the posterior wall of the fossa. This would be sheer carelessness.

The table shows the area of anesthesia obtained in the 365 injections, together with the side effects. Failure of complete anesthesia may have been due to improper technic, injecting into the nasal fossa (which can be noted by patient coughing during the injection), injection into a vessel or failure to inject a sufficient amount of solution to penetrate the central fibers of the nerve bundle.

### ■ *Technic of Injection*

The technic of injection is simple. Szerlip prefers a previously ascertained

needle distance obtained by the method of Jorgensen,[5] which is an excellent approach. Other men have used various fixed needle distances. In this study, no fixed needle depth was used, except that a 26 gauge, 1⅝ inch stainless steel or iridioplatinum needle was used, but it was never inserted to full depth. (In all injections it is well to leave a portion of the needle exposed to facilitate removal in case of breakage.) The point of insertion usually is on a line from the mesiolingual cusp of the second molar to the palatine foveola, about one third of the soft tissue distance. A few drops of solution are injected into the soft tissue and the foramen "felt for" with the needle. When it is found, the needle is inserted gently about 1¼ inches up the canal until a bony resistance is encountered, or until the needle is inserted almost full length. Solution is deposited in advance of the needle, and about 2 cc. deposited in the fossa in proximity to the nerve. The angle of insertion varies between 45 and 60 degrees—never more—with the occlusal plane. Gentleness is of paramount importance, and at various stages the pressure on the plunger is released in order to check for possible entry of the needle into a vessel, which is manifested by the appearance of a stream of blood entering the carpule.

### ■ *Advantages, Disadvantages and Contraindications*

The advantages of this type of injection are:

1. It gives a simple, safe, direct approach when profound anesthesia of maxillary teeth or adjacent tissues is desired, and can be used for surgery, operative or periodontal treatment.

2. The anesthesia produced is profound and persistent.

3. Only two injections are needed to anesthetize the entire maxillary region, and the possibility of hematoma is eliminated.

4. It can be used when infection precludes an injection in anterior areas. (Excellent anesthesia may be obtained with this injection, coupled with infiltration or infraorbital block on the opposite side.)

5. Tissue movement will not displace a broken needle which, if present, can be removed easily.

The disadvantage in its use is that it cannot be utilized where trismus or infection in the area of injection prevent approach. It is contraindicated for the extremely young or for other individuals who cannot exercise self-control when receiving injections; that is, in persons who are prone to jump or move unexpectedly.

### ■ *Conclusions*

The nerve block of the maxillary nerve via the pterygopalatine route is a relatively simple, safe and effective means of securing anesthesia of the maxillary nerve and its branches, and its more widespread use is warranted. Some side effects, notably diplopia, have been noted but these effects are transient, of relatively short duration and should not preclude use of this injection. Any dizziness caused by diplopia may be relieved immediately by covering the affected eye.

5. Jorgensen, N. B. Measurements for intra-oral block of the maxillary nerve. J. Oral Surg. 6:1 Jan. 1948.

# A treatment of fascial abscesses of odontogenic origin

■ *Norman R. Nathanson, D.D.S., Framingham, Mass.*

Acute infections of dental origin have always been a problem of great importance. Although the use of antibiotics has minimized the dangers attending the spread of infection, it is generally acknowledged that antibiotics alone cannot always be relied on to eradicate abscesses completely. Therefore the location and removal of pus remains a vital consideration.[1] A technic for the treatment of fascial abscesses of dental origin by aspiration and instillation of penicillin will be described.

Odontogenic infections, whether apical, periodontal or pericoronal frequently escape beyond the confines of the jaws and involve contiguous soft tissue structures by direct extension along fascial planes or to even more distant parts by transportation along lymphatics to regional nodes.[2]

Prior to the time of antibiotics and chemotherapy, there were no agents which controlled infections by direct action against the invading organisms. The treatment was supportive and consisted of bed rest, administration of forced fluids, application of hot moist compresses and incision and drainage when an abscess was localized.

External incision and drainage still are used in the treatment of fascial abscesses. To be effective, the wound must be fairly extensive since an inadequate incision is little better than no incision. Such a wound, when created, although releasing the localized pus, results in an infected open wound. On healing, a facial scar remains since there is no clean approximation of epithelium. The underlying tissues become fibrosed with resulting contracture and depression of the wound.

In view of the above, I have tried to avoid external incision whenever possible, and to use instead a method which allows the release of pus, and at the same time permits instillation of penicillin at the exact place where it will do the greatest good—the place where the organisms reside. When given systemically there is probably little passage of penicillin through the abscess wall. Even though penicillin is given intramuscularly or intravenously to produce a high blood level, there may not be an adequate concentration within the abscess. I have found that fascial abscesses have been adequately controlled by the following procedure, even when localization has progressed to the extent that only a paper-thin skin surface remains over the involved area.

1. Shapiro, H. H.; Sleeper, E. L., and Guralnick, W. C. Spread of infection of dental origin. Anatomic and surgical considerations. Oral Surg., Oral Med. & Oral Path. 3:1407 Nov. 1950.

2. Thoma, K. H. Oral pathology, ed. 3. St. Louis, C. V. Mosby Co., 1950, p. 608.

*Fig. 1—Fascial abscess resulting from apical infection of lower left first molar*

■ *Aspiration of Pus and Instillation of Penicillin*

The following procedure is indicated in cases of acute disease in which an abscess is found containing a considerable amount of pus, and in cases of chronic abscesses which do not yield to the conservative treatment.[3]

The aspiration of pus and instillation of penicillin may be combined with the elimination of the cause of the infection, or the process may be accomplished separately. The patient should receive parenteral penicillin and hot moist compresses should be applied to the affected part as soon as it becomes evident that abortion of the abscess by antibiotic therapy alone is unsuccessful.

When fluctuation can be elicited, the skin is sterilized and infiltration of the skin with a local anesthetic solution is carried out. A 20 gauge needle attached to a syringe of 10 cc. capacity is used for the aspiration. The needle is inserted through the anesthetized skin and is advanced slowly so that it will penetrate into the center of the abscess cavity. It should not be inserted too far because of the danger of carrying the infection into deeper structures. As the needle is advanced, negative pressure is applied to the plunger so the pus will flow into the syringe as soon as the needle point enters the abscess cavity. If the syringe becomes filled, it is detached, leaving the needle in place and another syringe used to complete the aspiration. It is then replaced by another syringe previously filled with a freshly prepared penicillin solution (100,000 units per cubic centimeter) in sufficient quantity to replace the evacuated pus. Added to the penicillin solution is approximately one fourth its volume of a 2 per cent procaine hydrochloride solution which aids in making the injection of the penicillin painless. This solution is instilled directly into the abscess cavity.

Improvement usually results from the first aspiration because of the immediate release of pressure of the accumulated purulent debris. One to three aspirations usually are sufficient.

■ *Report of Case*

A 13 year old white girl was admitted to the hospital on February 1, 1951 because of swelling and pain in the left side of her face (Fig. 1).

Four days previously the jaw had begun to swell. This was accompanied by chills and temperature varying from 101 to 104° F. Pain had gradually increased in intensity and 200,000 units of penicillin was administered intramuscularly every three hours.

Examination revealed a large fluctuant mass opposite the angle of the left

3. Thoma, K. H. Oral surgery, vol. 2. St. Louis, C. V. Mosby Co., 1948, p. 941.

*Fig. 2—Left: Subdermal injection of procaine hydrochloride. Center: Aspiration of pus. Needle in place to receive penicillin syringe. Right: Instillation of penicillin*

side of the mandible. There was moderate trismus and the mouth opening was limited to approximately 2 cm. The breath was foul. Intraorally, a deeply carious lower left first molar was evident. The white cell count was 22,500 and the temperature 103.5° F.

Roentgenographic studies revealed the left side of the mandible to be normal in texture and density with the exception of some osteolysis about the roots of the first molar.

Penicillin therapy was continued and on February 2, under nitrous oxide-oxygen and ether anesthesia, the lower left first molar was extracted. Ten cc. of foul pus was aspirated from the abscess and an equal amount of penicillin was instilled. The culture of the pus showed alpha hemolytic streptococci.

On February 3, under sterile procedures, 1 cc. of procaine hydrochloride was injected subdermally (Fig. 2, left). A 10 cc. syringe attached to a 20 gauge needle was used for the aspiration. The point of the needle was advanced into the center of the still fluctuant area. Negative pressure was applied by withdrawal of the plunger until pus flowed into the barrel (Fig. 2, center). After completion of the aspiration of about 6 cc. of pus, another syringe was attached to the needle and an equal volume of a mixture of penicillin and procaine solution instilled (Fig. 2, right).

On February 5, the swelling had receded although the submaxillary region was still slightly indurated. The patient was discharged from the hospital the following day. By February 9, swelling had completely disappeared (Fig. 3). Roentgenographic examination revealed only the site of recent extraction with no evidence of osteomyelitis.

*Fig. 3—Patient nine days postoperatively*

■ *Discussion*

This method has proved successful in the treatment of chronic fascial abscesses as well. Such abscesses usually are well encapsulated and may produce large swellings in the region of the mandible. Although they contain a considerable amount of pus, they may produce little change in the appearance of the skin and may not exhibit other signs of inflammation. A retained infected tooth usually is the etiologic agent. If this is not evident, it is wise to rule out tubercular adenitis by an adequate smear and culture study.

The technic of aspiration of pus and instillation of penicillin should not be abused. It should be employed only when there is definite evidence of fluctuation. When a fascial abscess has progressed to the point of considerable and widespread involvement, external incision should be made and drainage instituted at the earliest opportunity.—29 *Lincoln Street.*

# An improved extraoral technic for reduction and fixation of mandibular fractures: a preliminary report

■ *Sterling G. Mead,* D.D.S., and George D. Selfridge,† D.D.S., Jacksonville, Fla.*

Many new technics for extraoral fracture fixation have been developed in recent years, and, in addition, variations of older methods have been tried. The use of an extraoral technic in the reduction of mandibular fractures is not an innovation. Examples of its use as far back as 1,100 years ago are mentioned in the literature. The methods, which in previous years have been thought sound mechanically but unsound biologically, must be reappraised in the light of present day knowledge. Chemotherapeutic and antibiotic therapy also must be taken into consideration in this reappraisal.

Metal appliances in past years were radically different from those of today. Not only are new metals available for medical use, but the technics for utilizing

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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such products have kept pace with the improvement in the materials. Tantalum, Vitallium and stainless steel are important metals which are now available for use in surgery. Many mechanical appliances of past years that failed in their clinical application can now be used successfully. The combination of improved technics and better materials, the tremendous strides in the field of anesthesia, improved medical and dental education, better facilities for rendering necessary care to more people, and finally, the contemporary advances in materia medica and therapeutics have been largely responsible for this change.

■ *Extraoral Fixation Appliances and Technics*

There are many types of extraoral pin fixation appliances as well as various technics for their use. Many are used routinely and others in certain specific cases. The Penn-Brown and Thoma appliances, which utilize a clamp principle after an extraoral surgical exposure of the fracture site, are examples of extraoral fixation devices. The Kirschner wire technic, which is not as frequently used in mandibular fractures, embodies the principle of driving a metal nail into the medullary space across the fracture site, thereby providing rigid immobilization.

The extraoral pin technics have several disadvantages. First, the weight of the immobilizing bar tends to loosen the inserted pin—the pin in reality becoming a lever. Second, it is necessary to drive a pin through the medullary bone and into the opposite cortical plate. Third, these technics are difficult and are, of necessity, time-consuming, even in expert hands. Fourth, all are hazardous because of the possible injury to the inferior dental nerve or to the teeth.

The Penn-Brown clamp and the Thoma clamp have three basic disadvantages. The first, and most important, is the necessity of an open reduction for the application of the appliances. Second, a clamp compresses a relatively broad area of cortical bone. Third, the clamp method is relatively time-consuming. The Kirschner wire technic likewise has three basic limitations: (1) the necessity of accurate reduction at the time of operation and the inability to adjust postoperatively; (2) the danger of injury to the inferior dental nerve, and (3) the difficulty of inserting the nail at the point of entry, as, for instance, in fractures at the angle of the mandible.

■ *Adaptation of Towel-Clamp Principle*

A towel clamp to pull a fracture segment into position probably has been used by the majority of oral surgeons; it forms a firm grip on the cortical bone and yet apparently does not damage it significantly. It was this observation that led us to attempt to perfect an appliance based on a towel-clamp principle that would retain all the advantages of other extraoral methods and yet have none of the disadvantages. In other words, a closed method which would be applicable to the majority of cases and one which would be simple and effective.

ANESTHESIA—Any type of anesthesia may be employed, local, general or a combination of the two. Our preference is local anesthesia when possible. The skin

is prepared in the usual manner; the patient then is properly draped. While strict asepsis is not always possible or practical, it is desirable, and every effort should be made to adhere to the principles of sterility. Infection always has been a potential danger with fractures of any description. This danger is increased by the application of extraoral fixation appliances; however, such potential danger is a minimal factor today because of the advent of antibiotics and chemotherapy. In certain types of treatment, it is frequently desirable not only to combine antibiotic drugs such as penicillin and streptomycin, but it is often advantageous to utilize one or more of the sulfa group as a supplement. Our patients are carried preoperatively and postoperatively under such selected medication.

USE OF APPLIANCE—The appliance consists of three basic parts: clamp sets, bar and universal joints (Fig. 1, left). As the terminal ends of the clamps are sharp, it is possible to puncture the skin and

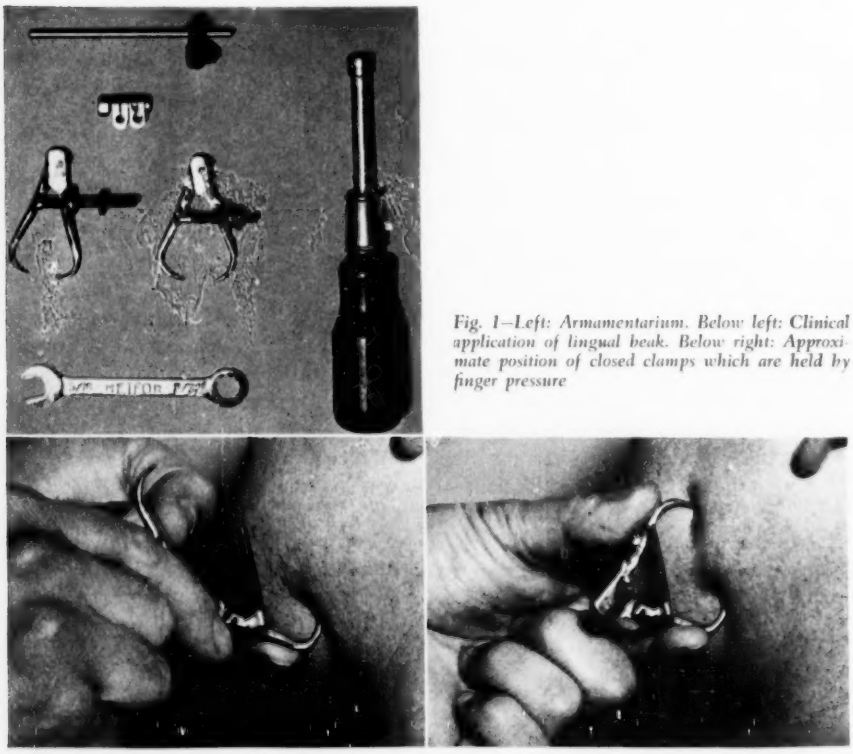

*Fig. 1—Left: Armamentarium. Below left: Clinical application of lingual beak. Below right: Approximate position of closed clamps which are held by finger pressure*

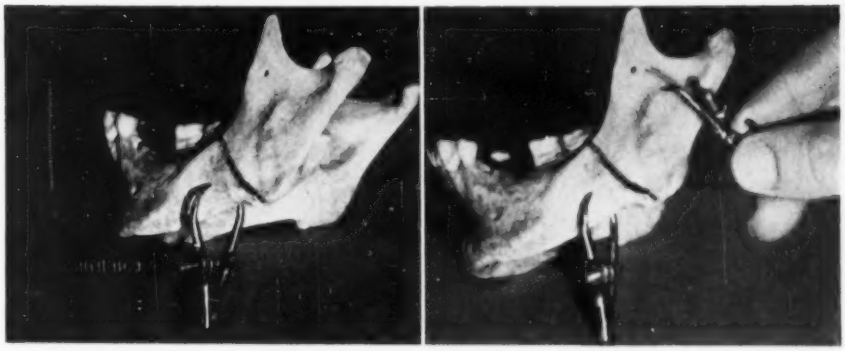

*Fig. 2—Left: Anterior clamp in position; set-screw nut adjusted to desired position. Right: Application of posterior clamp; lingual beak engaged in cortical bone*

underlying tissue without making an incision. The skin, at desired points of entry, is stretched and held taut by finger pressure so as to avoid the possibility of postoperative skin dimpling. The lingual beak is applied first (Fig. 1, below left); by staying close to the bone all nerves and blood vessels are avoided. As soon as this beak has been firmly engaged into cortical bone, the buccal beak is closed manually until it engages the lateral surface of the mandible (Fig. 1, below right). Finger pressure is applied to the clamp while the set screw is tightened sufficiently to secure the points in cortical bone (Fig. 2, left). It will be seen that the two points are directly opposite one another and that both are subject to the same amount and direction of pressure. The clamp set then is applied to the opposite side of the fracture site and secured (Fig. 2, right); each set is approximately 2 cm. from the fracture line (Fig. 3). Any number of clamps may be used, depending on the number of fractures. The set screws are easily tightened and may be adjusted quickly and without difficulty at any time during the course of healing.

After the clamps are in position the fracture is manually reduced and the assembling device placed in position. One joint holds the connecting bar and the other slips over the set screw. By simply tightening one bolt on either side the entire assembly is made rigid and the frac-

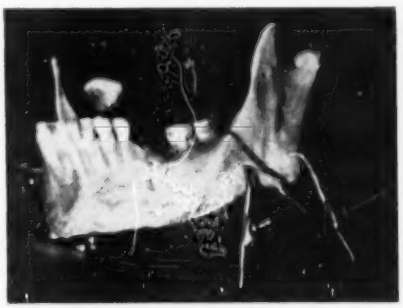

*Fig. 3—Anterior and posterior clamps in proper position in relation to fracture site*

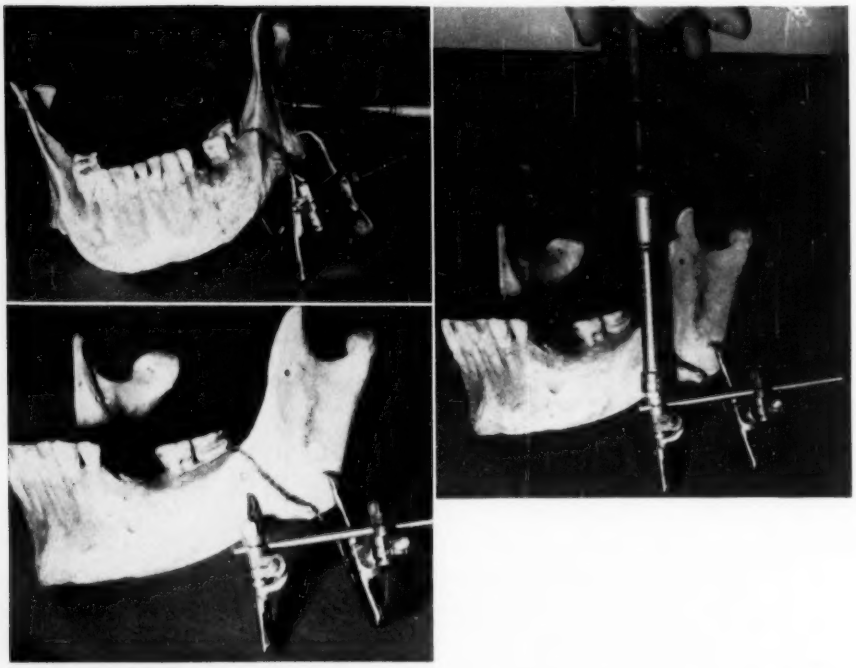

*Fig. 4—Above left: Universal joint properly placed on anterior clamp. Below left: Complete apparatus in position with fracture immobilized. Right: Method of securing anterior universal joint with cross-bar member in position, thus establishing immobilization of forward position. Similar procedure with posterior universal joint*

tured segments are immobilized (Fig. 4).

Intermaxillary wiring with elastic traction may be utilized in selected cases and the appliance described used subsequently. Theoretically, manual reduction may be accomplished in the majority of mandibular fractures, but there are certain cases where elastic traction is a great aid in reduction. The use of this extraoral splint after intermaxillary wiring with elastic traction reduction would serve merely as an immobilizing agent, and would permit the patient to enjoy the advantages of masticatory function as well as to maintain good oral hygiene.

■ *Case 1*

The first patient was a 19 year old sailor with a fragmented fracture in the first molar region. The teeth were wired for temporary immobilization (Fig. 5, left); this mandibular fracture was one in which many methods might be used and yet none was definitely indicated. The towel-clamp method was selected; reduction and fixation were accomplished,

*Fig. 5—Case 1. Left: Preoperative roentgenogram showing intermaxillary loops for temporary immobilization of anterior segments. Center: Appliance in position. Right: Postoperative roentgenograms taken in seventh week*

but it was found that the clamps were not "bowed" sufficiently and they therefore compressed the soft tissue. It then became necessary to fashion a new clamp of the desired curvature. The undesirable clamp was subsequently removed and the new one inserted (Fig. 5, center). The postoperative course of six weeks was uneventful and there was no complication other than a slight scarring as a result of the skin compression from the first clamp (Fig. 5, right).

■ *Case 2*

The second patient was a 19 year old Marine with a fracture of the mandible near the midline (Fig. 6, left). The method of choice in this instance could easily have been intermaxillary wiring, but since the patient was in Marine aviation school it was felt he could be returned to limited duty if the jaws were not immobilized. The entire procedure of reduction and fixation was accomplished in less than 15 minutes (Fig. 6, center). A

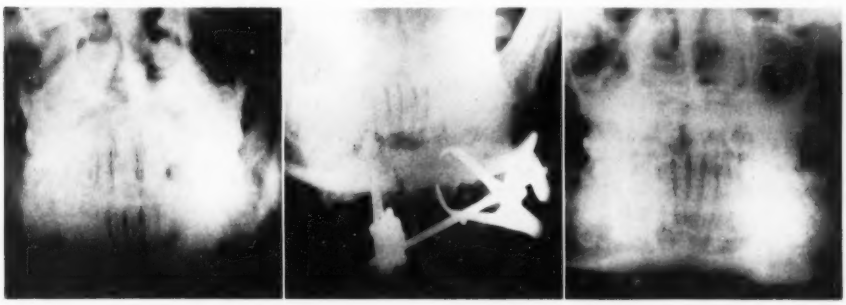

*Fig. 6—Case 2. Left: Preoperative roentgenogram. Center: Appliance in position. Right: Postoperative roentgenogram taken in seventh week*

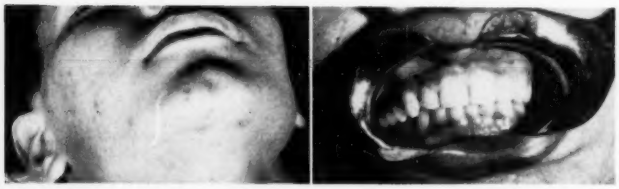

*Fig. 7—Case 2. Left: Patient, third week after removal of appliance. Right: Patient's occlusion, sixth week after removal of appliance*

normal diet was instituted the third postoperative day, and the appliance was removed at the end of four weeks (Fig. 6, right). Subsequent observation showed only slight scarring (Fig. 7).

■ *Case 3*

Our third patient was a 32 year old white woman. This patient was admitted from an Army air base in Georgia on the seventh day after her injury. Roentgenographic examination revealed a bilateral angle fracture with severe medial-superior displacement on the right side.

As both fractures were posterior to any dentition, it was felt that extraoral fixation was the method of choice. This was accomplished the day after the patient's admission to the hospital. There were no complications, and a normal diet was instituted the second day postoperatively. Clinical and roentgenographic examinations reveal the relation of the fracture segments to be satisfactory; there is minimal skin irritation present and the patient is comfortable.

■ *Discussion*

Our appliance has been fashioned of stainless steel. It is conceivable that a lighter, more resilient metal, but one with the same tissue tolerance and strength could be used to improve the clamps. It is also hoped that an improvement will be found which will eliminate the set screw; for example, a hinge that locks at intervals automatically as it is pressed together. Each time the appliance has been used, the need for various corrections and improvements has been seen; however, the original premise has been shown to be correct and it is merely our technic and appliance that need refining. In the past appliances have been crude and technics equally inadequate; however, with the basic design now established, it is only reasonable to surmise that needed improvement in design as well as in techinc will be forthcoming.

ADVANTAGES—The advantages of the clamp-like appliances are as follows:

1. Simplicity in design.
2. Speed of use.
3. Extraoral closed reduction.
4. Possibility of postoperative adjustment.
5. Aid provided by a balanced fulcrum to prevent displacement of points through accidental trauma.
6. Minimum of contact with cortical bone.

7. Greater stability.

8. Availability for many types of mandibular fractures.

9. Ability of patient to maintain a normal diet as well as to improve oral hygiene.

10. Lessening of danger from aspiration of vomitus.

11. Freedom from discomfort on the part of the patient during convalescence.

12. Avoidance of injury to inferior dental nerve or teeth.

DISADVANTAGES—The chief disadvantages of this appliance are as follows:

1. It is not applicable to all mandibular fractures; for instance, it cannot be used high on the ramus or for coronoid and condyloid fractures.

2. It is not an improvement esthetically over other extraoral appliances. It is hoped, however, that improved design will permit a closer adaptation of the appliance to the skin.

3. The minimal amount of scarring which results from any method of extraoral fixation.

■ *Summary*

Preliminary observations indicate that the towel-clamp method of immobilization has definite merits in the treatment of selected mandibular fractures. The simplicity of design, the ease of adaptation and the possibility of greater stability make this appliance worthy of further clinical study in order to determine its place in the armamentarium for mandibular fractures.—*U. S. Naval Hospital.*

■ ANTIBIOTICS

The word "antibiotic," in the present accepted sense, was redefined in 1942 to embrace the products of microorganisms that have an inhibitive or destructive effect upon the growth of other microorganisms. Beginning in 1939, a number of new compounds that had antimicrobial properties were isolated in rapid succession from cultures of bacteria, fungi, and actinomycetes. The isolation of gramicidin and tyrocidine in 1939 was followed by the reisolation of penicillin in 1940-41, by the isolation of actinomycin and of streptomycin in 1940-43, and later of numerous new compounds. Before 1940, the actinomycetes were known to possess antimicrobial properties, but only two preparations, of questionable importance as antibiotics, were recognized. At present, nearly 100 compounds and preparations are known to be produced by this group of organisms. These products comprise some of our most valuable antibiotics, and new ones are being added to the list constantly.—*Selman A. Waksman, "The Changing Concept in Microbiology," The Scientific Monthly 76:129 March 1953.*

VOLUME 11 • OCTOBER 1953 • NUMBER 4

CASE REPORTS

# Three nonvital teeth associated with chorio-epithelioma: *report of case*

■ *Andrew F. Catania, M.D., D.D.S., Brooklyn, N. Y.*

Increasing clinical and pathological evidence emphasizes the wide association of oral symptoms with systemic disease. Metastatic lesions of the mandible are exceptionally rare, but their presence must be suspected in the differential diagnosis of atypical signs and symptoms. Carcinoma in certain sites causes skeletal metastasis more frequently than others. Geschickter and Copeland[1] estimate that nearly 50 per cent of breast, renal, prostate and bronchogenic carcinomas produce osseous lesions before termination of the disease. Cancer of the skin, mouth, and uterine cervix is less likely to produce skeletal metastasis because the regional lymphatics act as a filter. In the order of frequency, the bones most commonly involved are the spine, pelvis, femur, skull, ribs, humerus and occasionally the mandible.

Chorio-epithelioma is a malignant tumor of the uterus which evolves from a residual remnant of normal pregnancy or miscarriage. In its normal development a fetus is encapsulated by an outer protective covering, the chorion, which attaches to the uterine wall by (chorionic) villi or projections. After a miscarriage or a normal delivery these villi are absorbed. On the other hand, if these villi should persist and undergo cystic degeneration, they are called hydatidiform moles. Moles occur in about one out of every 2,000 pregnancies and are generally accepted as precancerous lesions.[2]

The most prominent characteristic of chorio-epithelioma is profuse bleeding. Even metastatic lesions which invade blood vessels proper do not produce the amount of bleeding seen with this growth.[3] Theoretically the difference may be in some undiscovered local disturbance of the bleeding and coagulating time in the involved region.

Cells of this characteristically hemorrhagic tumor are trophoblastic. They produce a gonadotrophic hormone which can be detected by suitable pregnancy tests.[3]

The primary lesion metastasizes early, usually to the lungs, which suggests that the cells are transmitted through the blood and not the lymph.[4] There is a notable scarcity of metastatic lesions to any bones or lymph nodes.[4] Another peculiarity which has been noted with chorio-epithelioma is the usually rapid regression of the primary tumor.[5]

Associate, dental departments, Greenpoint and Maimonides Hospitals. Assistant professor, oral surgery department, New York University College of Dentistry, New York.

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REPORT OF CASE—A 21 year old girl reported to the office on August 11, 1949. She complained that she had experienced a sudden onset of paresthesia of the right side of the lower lip about one week previously. A small painful swelling in the mandibular right cuspid and bicuspid region had been present for three days.

The difficulties appeared spontaneously and progressed slowly. Mild sedation such as aspirin adequately relieved the pain. No elevation of temperature, chills or trismus were noted. She had been under medical treatment during this same week for a "bee-bite" on the occipital aspect of the scalp.

The only pertinent fact learned from her past history was that she had fallen from a bicycle in 1945, at which time she had sustained abrasions, lacerations and ecchymosis of the right side of her face.

EXAMINATION—The patient was a thin, frail, married, white girl with a perceptible pallor. She was not in distress. The oral temperature was normal. The "bee-bite" on the scalp was edematous, hemorrhagic, tender and about the size of a quarter. No swellings were visible extraorally.On palpation the right side of the lower lip *per se* was not swollen, but there was a suggestion of an intraoral swelling. Paresthesia could not be demonstrated. Motor activity of facial muscles was normal. No cervical adenopathy was palpable.

The intraoral hygiene was good. The buccal aspect of the mandibular right cuspid and bicuspid region had a diffuse and noninflammatory bulge about 15 mm. by 10 mm. by 5 mm. The overlying mucous membrane appeared normal in color. On palpation the swelling was painful, diffuse, hard, fixed, smooth and nonfluctuant. When tested, the first bicuspid, cuspid, and lateral incisor teeth were nonvital, not tender to percussion, slightly mobile and free from caries or fillings. The floor of the mouth was normal in color, size and texture.

Intraoral and right lateral oblique (Fig. 1) roentgenograms revealed a pea-sized circumscribed radiolucent area inferior, but apparently not attached, to the apexes of the first or second bicuspids. No caries was present. The tentative diagnosis was devitalization of the mandibular right first bicuspid, cuspid and lateral incisor teeth resulting from the trauma incurred by the bicycle fall in 1945.

The recommendation was either root canal therapy with frequent observation of the radiolucent area, or extraction of the teeth with removal of periapical tissue for pathological examination.

TREATMENT—The patient chose to have the teeth extracted. Under general anesthesia the three teeth were removed. Immediately after the removal of the first bicuspid and cuspid teeth a massive profuse pulsating hemorrhage ensued, the severity of which had never been experienced in the office. It was comparable to the bleeding from a freshly severed moderate-sized artery. Oxidized cellulose packed into the sockets, along with thick mouth packs under

*Fig. 1—Intraoral and right lateral oblique roentgenograms taken on admission. Pea-sized circumscribed radiolucent area apparently is not attached to any teeth*

heavy pressure finally controlled the unceasing flow to a large degree. Under these conditions it was obviously impossible to obtain any periapical tissue.

The patient went into shock—the pulse was rapid and thready—the blood pressure was 80/60. Immediate intravenous fluid therapy was contemplated but the administration of pure oxygen with the patient in Trendelenburg position hastened the recovery. She left the office with a pulse rate of 90 per minute and a blood pressure of 106/85. She apparently was in good condition. Sedatives were prescribed.

When the three extracted teeth were cracked open it was found that they had degenerated pulp. The cuspid apex was eroded.

POSTOPERATVE COURSE—In the light of the above episode, the patient was strongly advised to visit her physician for a complete physical, including hematologic, examination.

The surgical site healed extremely slowly. Local socket pain was relieved with daily guaiacol and eugenol dressings. Several postoperative intraoral roentgenograms were negative. The parasthesia persisted.

Eleven days after surgery she had a short episode of spontaneous hemoptysis of large dark red blood clots. Her family physician prescribed sedatives and advised that a chest roentgenogram be taken. The succeeding day a chest roentgenogram revealed "a round radiolucent area" suspected by the roentgenologist to be a tubercular infection. A chest specialist, however, diagnosed the area as "aspirated blood" and recommended observation and additional roentgenograms. A second chest specialist found no evidence of either tuberculosis or aspirated blood.

One week later the "bee-bite" on the occiput bled profusely and required suturing by her physician. Two days later, the patient experienced an episode of hematemesis and hemoptysis of fresh red blood. Both stopped as spontaneously as they started.

On September 3, 1949, after another severe episode of hemoptysis, the patient went into a deep coma and was taken to a city hospital. In the history her husband reported that in 1947 she had had a miscarriage of a five month pregnancy, and in April 1949 a polyp had been removed from the uterus.

PHYSICAL EXAMINATION ON ADMISSION—The patient had a rectal temperature of 100° F., a pulse rate of 120 per minute, and blood pressure, 75/55. An ulcerating and hemorrhagic lesion was present on the vertex of the scalp. The right submaxillary nodes were palpable. There was no neck rigidity. There seemed to be a palpable mass in the left breast. Dullness was present in the base of the right lung and rales were audible throughout both lungs.

The sockets of the extracted teeth appeared to be healing, there was no visible bleeding and no petechiae on the pale mucous membrane.

The skin was cold and clammy, and there were no petechiae. The abdomen was soft throughout. There were signs of an enlarged uterus. No other organs or masses were palpable.

It appeared that a blood dyscrasia had to be considered. Atelectasis apparently was present.

The laboratory and roentgenological examinations which were performed immediately after admission of the patient revealed: hemoglobin, 9 Gms. per 100 cc.; red blood cells, 3,380,000 per cubic millimeter; white blood cells, 19,200 per cubic millimeter. The polymorphonuclear leukocyte count was 76 per cent (unsegmented, 9 per cent; segmented, 67 per cent); lymphocytes, 22 per cent; monocytes, 2 per cent; eosinophils, 0 per cent. The platelet count was 365,000 per cubic millimeter; the prothrombin time was 12 minutes; bleeding time, 2 minutes; clotting time, 3 minutes. The urinalysis was negative. No tubercle bacilli were found in the sputum. The Rumple-Leede (tourniquet) test was negative after 15 minutes.

The chest roentgenogram revealed: "No cardiac, mediastinal or diaphragmatic pathology. One moderate sized round mass in the right mid-lung. One smaller mass in the upper hilum. No fluid." The roentgenologist reported: "Findings are those of a tumor."

On admission the patient received 500 cc. of plasma intravenously; 1,500 cc. of 5 per cent glucose in saline solution intravenously; 500 cc. of whole blood intravenously; 300,000 units of procaine penicillin G intramuscularly.

Oxygen was administered whenever it was necessary.

She responded well to this therapy and by the next day regained consciousness. The greatest change in the period of 24 hours was revealed in a chest roentgenogram which indicated: "No cardiac or mediastinal pathology. Right lung shows one large lobular and rounded mass in the thorax with numerous smaller rounded masses scattered throughout both lung fields. No other findings. Findings are markedly progressive since last examination. Impression is probable multiple metastatic tumor." Roentgenograms of the entire skeleton did not demonstrate any other pathologic bone condition.

She received 500 cc. of whole blood intravenously daily for the next three consecutive days. On September 7, 1949 a Papanicolaou stain of the sputum revealed no malignant cells.

On this same date, on the basis of soft breasts and other signs of pregnancy, the gynecological staff suspected a chorio-epithelioma. The results of the Ascheim Zondek pregnancy test supported their impression. They recommended curettage of the uterus to obtain a specimen for examination.

The surgical staff stated: "The mass in the occiput is considered metastatic."

The genitourinary service performed a Papanicolaou stain on several vaginal smears and discovered cornified epithelium and no cells of malignant criteria. Furthermore, intravenous pyelograms showed normal kidney shadows, thereby ruling out a hypernephroma.

After examination of the slide which had been made of the uterine tumor removed in April 1949, the hospital pathologist stated: "The tumor is a hydatidiform mole with no signs of malignancy" (Fig. 2).

The patient refused further treatment at the city hospital. On September 16, 1949 she transferred to another hospital.

PHYSICAL EXAMINATION—The pertinent findings in the physical examination made in the second hospital were: oral temperature, 99° F.; blood pressure, 165/100; and pulse, 98 per minute. A circumscribed lump was present in the right posterior parietal region of the head, allegedly an insect bite. There was a nontender swelling in the mandibular right bicuspid and cuspid region. There was flatness to percussion in the anterior part of the chest in the third to the fifth intercostal spaces, about 5 cm. to the right of the sternum and extending to the right anterior axillary fold. Breath sounds were diminished throughout. The uterus was enlarged and soft. Urinalysis was negative. The blood count was: hemoglobin, 56 per cent; red blood cells, 2,720,000 per cubic millimeter; white blood cells, 14,700 per cubic millimeter (polymorphonuclear cells, 78 per cent; lymphocytes, 20 per cent). The red cells were normal in size and shape, but with a pronounced pallor.

*Fig. 2—Low-power photomicrograph of hydatidiform mole which had been removed from patient's uterus in April 1949. Note mucoid degeneration of connective tissue (A) and proliferation of epithelium (B) covering chorionic villus.*

The diagnosis by the gynecologist was chorionic carcinoma of the uterus with metastasis to the lungs. The patient immediately received 500 cc. of whole blood intravenously and pure oxygen whenever necessary. Procaine penicillin G in suspension (300,000 units) was adminis-

tered intramuscularly and continued twice daily.

On the following day a total cervical hysterectomy and bilateral salpingo-oöphorectomy was performed. The uterus was found to be extremely pale, soft and enlarged. The ovaries appeared to be normal. During the operation 500 cc. of whole blood was administered intravenously.

POSTOPERATIVE COURSE—The patient's temperature rose steadily. On the third postoperative day it was 102° F. She suddenly became extremely dyspneic and pale, and the pulse became rapid and thready. The impression was: "Possible embolism or atalectasis." Pure oxygen was administered through a nasal catheter, and 500 cc. of pure blood and 1,000 cc. of 5 per cent glucose in saline solution were administered intravenously. Heparin (100 mg.) therapy was started immediately and ordered for every eight hours. A small amount of fluid was recovered by taping the chest. This fluid was treated with Papanicolaou stain, but no malignant cells were found.

A roentgenogram of the chest taken on this day showed clouding of the left chest involving the base of the upper lobe and superior part of the lower lobe. There was an area of increased density and mottling throughout the upper right lobe with two circular areas that had the appearance of metastasis.

A complete blood count revealed hemoglobin, 52 per cent; red blood cells, 2,490,000 per cubic millimeter; color index, 1.08; white blood cells, 14,300 per cubic millimeter (polymorphonuclear cells, 86 per cent, of which 8 per cent were unsegmented and 78 per cent were segmented); lymphocytes, 13 per cent; eosinophils, 1 per cent; normoblasts, 2 per cent. Urinalysis was negative.

PATHOLOGIC EXAMINATION—The macroscopic examination showed the uterine endometrium to be yellowish gray and smooth. The microscopic examination showed that the endometrium was one large sheet of decidual cells. The glandular elements were few in number and were confined to the basal layers of the mucosa. Most of the glandular elements had the usually scalloped appearance of the late secretory phase; in most cases the glands were cystically dilated. The lining epithelium was of the late secretory type. There was definite lymphocytic infiltration. No metastasis or other lesions were present.

The ovaries both showed corpora lutea—four in one ovary and one in the other ovary. Yet these bodies were different from the corpora lutea ordinarily seen. They were composed of ribbons of corpus luteum cells which formed large solid bodies. No cavity of the type usually found in corpus luteum was noted. The ovaries contained few graafian follicles and numerous primordial follicles.

The diagnosis of the pathologist was: "Uterus with marked decidual reaction of the endometrium. Cystic degeneration of the cervic. Multiple corpora lutea (?). Fibrosis of appendix."

The patient's general condition became steadily worse and she died on September 21, 1949. The family granted permission to obtain a punch biopsy only of the lung after death. The pathologic examination showed that the tissue consisted of alveoli of the lung which were filled with exudate and blood. A portion of the specimen contained many rather large cuboidal Langhans' cells which were filled with clear protoplasm. Dispersed among these cells were large multinucleated masses which contained dark cytoplasm—syncytial cells. The diagnosis was metastasis of chorio-epithelium to the lung (Fig. 3).

Although postmortem examination of the lesions in the mandible and scalp was not permitted, the clinicians and pathologists were convinced that both were metastatic lesions of the chorio-epithelioma.

COMMENT—In retrospect, the patient presented a textbook picture of chorio-epithelioma. Such cases admittedly are rare, yet it exemplifies the close relationship of systemic disease to symptoms manifested in the oral cavity. Several important object lessons can be learned from this unusual case.

The sudden onset of paresthesia of the lip and the presence of nonvital teeth (free from caries or fillings) in the absence of trauma

more often result from lesions not related to dental pathology; for example, odontogenic cysts.

It must be emphasized again that a detailed and complete history is always extremely important. In spite of the meticulous care taken in recording the history in the office, this patient failed to reveal the episode of a miscarriage and the subsequent excision of a uterine tumor. Whether knowledge of these gynecological conditions would have aroused any suspicion preoperatively is questionable. However, in the face of the massive hemorrhage, such information would have been important. Too often patients withhold pertinent facts which they themselves deem unimportant.

Just as vital as the history is the examiner's over-all impression of a patient's general appearance. In this case the patient's thin frail build and pale complexion supported the family physician's tentative diagnosis of tuberculosis.

The "bee-bite" on the scalp and the mandibular lesion contributed an interesting addition to this whole picture. After the lung biopsy was reported as chorio-epithelioma, the clinicians and pathologists were fully in accord that these two afore-mentioned lesions were also metastases.

The removal of periapical tissue for pathological examination was contemplated; this is routine in the office. However, such a procedure was impossible in the presence of the massive shock-producing hemorrhage. The teeth might have been sent to the pathologist for examination. Perhaps sufficient tissue could have been recovered from the roots, or even from the pulp tissue, to have made the original diagnosis.

The rapidly increasing number of radiolucent circular metastatic lesions discovered in each subsequent chest roentgenogram demonstrated the speed of growth. Early metastasis to the lungs follows the textbook description. Autopsy study of 263 cases revealed metastasis to the lungs in 158 cases.[3]

Profuse bleeding and a positive pregnancy test are unique and pathognomonic to this malignant lesion. The ability of the tumor cells to secrete a gonadotrophic hormone produces a positive pregnancy test. The characteristic lesion of chorio-epithelioma is a dark red purplish nodule which microscopically appears as a mass of blood.[4] Rarely do other neoplasms or their metastasis simulate this hemorrhagic appearance.

Chorio-epithelioma preceded by hydatidiform moles are one to two times more frequent than those preceded by normal pregnancies.[3] Peculiar to this malignant tumor is the spontaneous regression of the primary lesion, especially if located in the vagina or lungs.[5]

SUMMARY—A case is reported in which there was paresthesia of the lower lip and devitalization of three clinically and roentgenologically apparently healthy teeth which resulted from a metastatic lesion. Massive hemorrhage at the time of the extractions aroused suspicion of a hematologic disorder. After several successive episodes of hemoptysis and hematemesis, the patient was finally hospitalized in coma. The history of a miscarriage and the removal of a

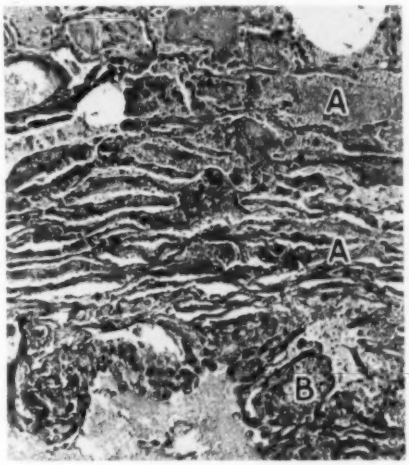



*Fig. 3—Low-power photomicrograph of postmortem lung biopsy. Alveoli of lung (A) are filled with exudate and blood. Portion of specimen (B) contains large cuboidal Langhans' cells filled with clear protoplasm and large multinucleated masses contain dark cytoplasm—syncytial cells*

uterine hydatidiform mole, plus the findings of soft and enlarged breasts, an enlarged uterus, a strongly positive (Ascheim-Zondek) pregnancy test, and multiple rapidly growing metastatic lesions in the lung added up to a classical picture of chorio-epithelioma of the uterus with metastasis to the lungs. Clinicians and pathologists unanimously agreed that the lesions of the scalp and in the mandible were metastatic. —*One Hanson Place.*

# Bilateral fibroma of the palate: *report of case*

■ *Morrison D. Beers, M.D., Chicago*

The case of "bilateral fibroma of the hard palate" reported here is interesting because of its rarity rather than because of its technical management. Interest in this problem has been aroused recently by a report of Hiebert and Brooks[1] on two such cases. This type of lesion is probably better designated "fibroma symmetrica gingivalis," as Fogh-Andersen[2] termed it in his report.

The present case, that of a healthy 16 year old boy, was referred for treatment in August 1951. At that time two large bilaterally symmetrical polypoid firm smooth masses (4 by 2 by 1.5 cm.) were present on the palate just above the gingival margin. These fibrous masses extended from the first bicuspids to and beyond the maxillary tuberosity. The only symptoms were annoyance due to the impaction of food above these masses, interference with speech and occasional gagging. The masses had been present for a period of eight years during which time growth was gradual. Etiology was not apparent.

The patient was observed for a period of eight months and then admitted to Grant Hospital of Chicago. Results of the blood count, urinalysis and serodiagnosis were within normal limits. Examination showed that the masses had increased in size since the first consultation so that they now overlapped in the midline (illustration, above left). Roentgenograms revealed no gross bony distortion of the palate or maxilla (illustration, above right).

Surgical removal was accomplished under anesthesia induced by nitrous oxide-oxygen, administered nasotracheally, combined with thiopental sodium-curare, administered intravenously. The fibrous masses were removed by sharp dissection along their bases. The bases were then contoured down to and including the periosteum with an electrosurgical loop electrode. The anterior palatine artery was ligated bilaterally anterior to the posterior palatine foramen. Hemostasis was complete at the termination of the operative procedure.

The report of the microscopic examination (illustration, below left) revealed that over part of the external surface there was squamous

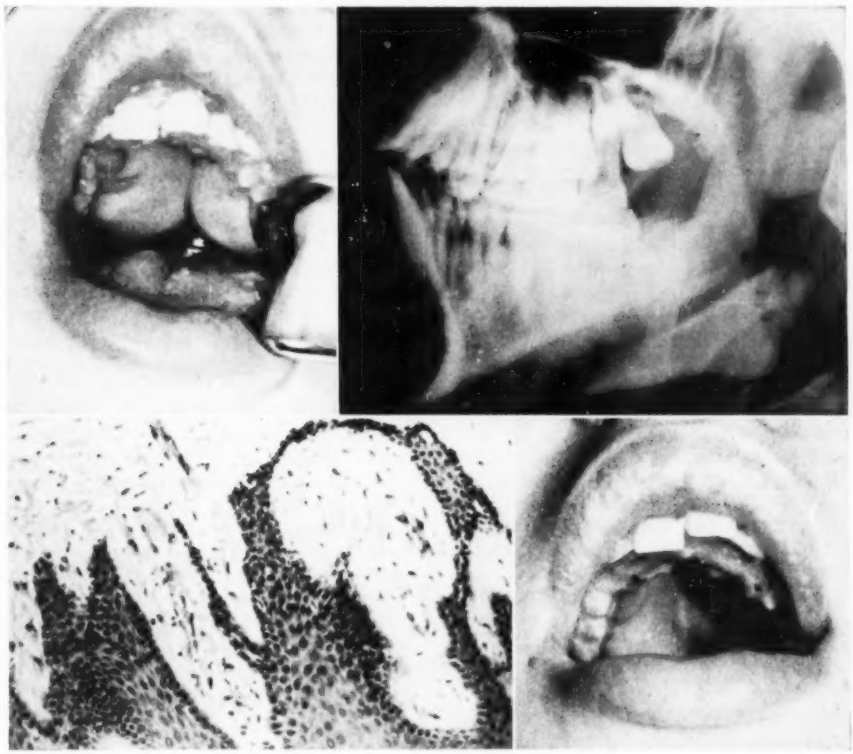
Department of plastic surgery, Grant Hospital of Chicago.

1. Hiebert, A. E., and Brooks, H. W. Fibroma of the palate. Plast. & Reconstruct. Surg. 5:532 June 1950.

2. Fogh-Andersen, Poul. Fibroma symmetrica gingivalis. Tandlaegebladet 47:145 March 1943.

epithelium, the rete pegs of which were elongated and fused. The underlying connective tissue was entirely collagenous with numerous fibroblasts throughout the entire section. Multiple small capillaries permeated the connective tissue. At the point of amputation, the tissue had a somewhat coagulated appearance, suggesting the effects of heat. The diagnosis of fibroma of the hard palate was substantiated.

The postoperative course was relatively free of pain or discomfort. Epithelization was complete in a period of eight days. The result after three weeks is shown in the illustration, below right. No recurrence is anticipated as all tumor tissue was apparently removed.



*Above left: Bilateral fibroma of palate, present for eight years in a 16 year old boy; characterized by firm, smooth, pedunculated, polypoid masses projecting from palatal tuberosity and gingival margin. Above right: Unerupted third molars but no other pathologic manifestation or occlusal distortion. Below left: Microscopic structure characterized by hypertrophied rete pegs accompanied by a variable basal layer proliferation. Fibrous stroma is relatively avascular with little or no lymphocyte infiltration. Fine character of connective tissue suggests reticular connective tissue. Below right: Palate completely healed three weeks after operation. Area of epithelization 3.5 by 2 cm.*

COMMENT—The etiology of "hard fibroma" of the palate is not yet satisfactorily explained. The disease is reported as occurring in the age group of 8 to 16 years. A hereditary factor is apparently present in some cases, in others an endocrine factor has been suggested.[3] The disease is usually noticed during the period of the onset of the permanent dentition and continues into puberty. Treatment becomes imperative to correct malocclusion and in some cases facial deformity and to eliminate the annoyance resulting from the obstruction of the oral cavity and the consequent speech difficulty.

Buchner reported two similar cases in 1937.[4] In one case there was a history of three such cases on the maternal side. In this case, however, in addition to the circumscribed palatal masses there was an associated diffuse fibroma or hyperplasia of the entire maxillary gingiva. Extensive radium therapy failed to alter the lesions. Radical surgical extirpation of the lesions down to the periosteum was performed with an excellent result. Thoma[5] in a discussion of fibromatosis presents a similar case without, however, making any mention of the number of cases he has encountered. F. Straith has a record of six unpublished cases. His one published case[6] is that of a unilateral fibroma on the palatal side of the maxillary left molars. Without giving any explanation for the condition, he mentions that there was considerable hyperplasia of the palatal tissues in the molar and tuberosity regions. In some of his cases he has encountered occlusal surfaces of 1 cm. or more which exhibited a similar generalized hyperplasia of the maxillary and mandibular molar areas. Straith asserts that in none of his cases has there been any tendency to malignancy.[7] W. B. Slaughter has a record of five unpublished cases.[8]

Fogh-Andersen in 1943 reported a case of "fibroma symmetrica gingivalis" in a 23 year old woman. He stated that after the lesion was excised surgically (sharp dissection) "healing was fast and without reaction and with a satisfying result" and that there was no recurrence after five years. He reviewed reports on 40 published cases, 27 female and 13 male.

The etiology and pathogenesis of this condition still remain obscure; hereditary, endocrine or inflammatory factors offer no definite answer as to the primary cause of these lesions. Fogh-Andersen, however, classifies this ailment as a typical dominant hereditary anomaly.

Although diagnosis is usually obvious, Thoma offers a differential diagnosis, considering the fibroma as consisting of alveolar enlargements caused by hyperostosis, inflammatory hypertrophy, elephantiasis or hypertrophy due to blood dyscrasias and the use of diphenylhydantoin sodium.[5] Other neoplastic lesions such as sarcomas and giant cell tumors also are of prime consideration in the differential diagnosis.

These lesions are essentially the same in all cases and are characterized by interlacing bundles of dense collagen fibers. Cells are few in number except in the papillae, where they are more numerous. Plasma cells and lymphocytes also are present. The surface epithelium is thin and contains areas of hyperplasia especially at the margin. Hiebert[1] states that these tumors may become ulcerated and necrotic because of the limited vascular supply. He mentions also the possibility that at times these tumors may be transformed into a fibrosarcoma.

Complete surgical excision is the procedure of choice. The use of electrical cauterization aids in the control of vascular oozing. The raw areas of the palate are epithelized in a relatively short time with little actual discomfort to the patient. Therefore, the attempt to salvage mucous membrane flaps is not necessary, since the primary objective of the procedure is to remove neoplastic tissue. Inadequate removal may increase the likelihood of recurrence or of actual change in cellular characteristics.

CONCLUSION—Complete surgical excision with or without the aid of electrocautery is suggested as the procedure of choice for the removal of a bilateral fibroma of the palate.

3. Mann, J. B.; Ash, J. E., and Bernier, J. L. Atlas of dental and oral pathology, ed. 3. Chicago, American Dental Association, 1944, p. 232.

4. Buchner, Howard J. Diffuse fibroma of the gums. J.A.D.A. & D. Cosmos 24:2003 Dec. 1937.

5. Thoma, Kurt H. Oral pathology. St. Louis, C. V. Mosby Co., 1941, p. 1006.

6. Straith, F. E. Fibroma of palatal tuberosity. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 28:434 July 1942.

7. Straith, Floyd E. Personal communication.

8. Slaughter, Wayne B. Personal communication.

# Giant cell tumor of mandible:
## *report of case*

■ *Mellor R. Holland,* D.D.S., M.S.D., Minneapolis, and Philip H. Moos, D.D.S., St. Cloud, Minn.*

A white woman, aged 61, was first seen for routine dental care in 1939. A horizontally impacted lower right third molar was removed, and the wound healed uneventfully. A bite-wing radiograph (Fig. 1, A) made in 1942 revealed good regeneration of bone and no evidence of pathologic change. A routine radiographic study done in March 1946 demonstrated the presence of a small radiolucent area in the bone (Fig. 1, B). A progress radiograph made in January 1948 (Fig. 1, C) demonstrated that this radiolucency was slightly enlarged. The patient was asymptomatic at the time.

In July 1950, further radiographic investigation (Fig. 1, D) revealed that the radiolucent area was larger. The patient complained of mild stiffness when opening the jaw. She was not seen again until December 1950, at which time biopsy disclosed the presence of a giant cell tumor.

The patient was admitted to the University of Minnesota Hospitals, January 8, 1951, for surgical removal of the tumor. Her complaint at that time was pain in the lower right jaw and occasional numbness of the jaw, lip, and tongue. The past medical history indicated that she had been reasonably well all her life. All positive abnormalities recorded were considered noncontributory.

The patient was pale, but fairly well developed and well nourished and in no acute distress. There was no cyanosis, dyspnea or jaundice. The head examination disclosed only moderate congestion of the turbinates and the positive oral findings.

The patient had a full upper denture with a scattered complement of lower teeth. The lips, tongue, floor of the mouth, cheeks and palate were essentially normal. The lower right second molar was somewhat tender to percussion. The edentulous lower right third molar region was slightly swollen, with a color change in the overlying mucosa suggesting some abnormality beneath. Palpation revealed some fluctuation of this portion of the alveolar ridge, indicating underlying bone loss. Minimal tenderness was present.

The blood pressure and pulse rate were normal, as were the heart, lungs and remaining organs. The hemoglobin was 13.6 Gm. and the leukocyte count 3,950, with 79 per cent neutrophils, 16 per cent lymphocytes, 2 per cent monocytes and 3 per cent eosinophils. The bleeding time was one minute 30 seconds and the clotting time was two minutes 30 seconds. The urine was normal. Blood calcium, phosphorus and alkaline phosphatase were considered within normal limits and not suggestive of hyperparathyroidism.

A right lateral oblique radiograph of the mandible demonstrated a radiolucent area posterior to the remaining molar tooth, measuring about 2 cm. in length and 1.5 cm. in depth (Fig. 1, E). The margins of the defect were smooth, and there was no superior border visible. The apex of the distal root of the first molar appeared to be involved in the lesion.

A serial radiographic study revealed the development of the tumor. In four years and 10 months the tumor had increased in size from that shown in Figure 1, B to the size demonstrated in Figure 1, E, offering some evidence of the rate of growth of a central giant cell tumor.

*Assistant professor, division of oral surgery, School of Dentistry, University of Minnesota.

The operation was performed on January 10, 1951, under thiopental sodium-curare and nitrous oxide-oxygen anesthesia with an endotracheal tube in position. An incision was made on the lower right alveolar ridge extending from the second bicuspid tooth area posteriorly to the ascending ramus. A large buccal mucoperiosteal flap was turned back. The tumor was readily encountered and was easily enucleated from its position in the mandible. The lower right

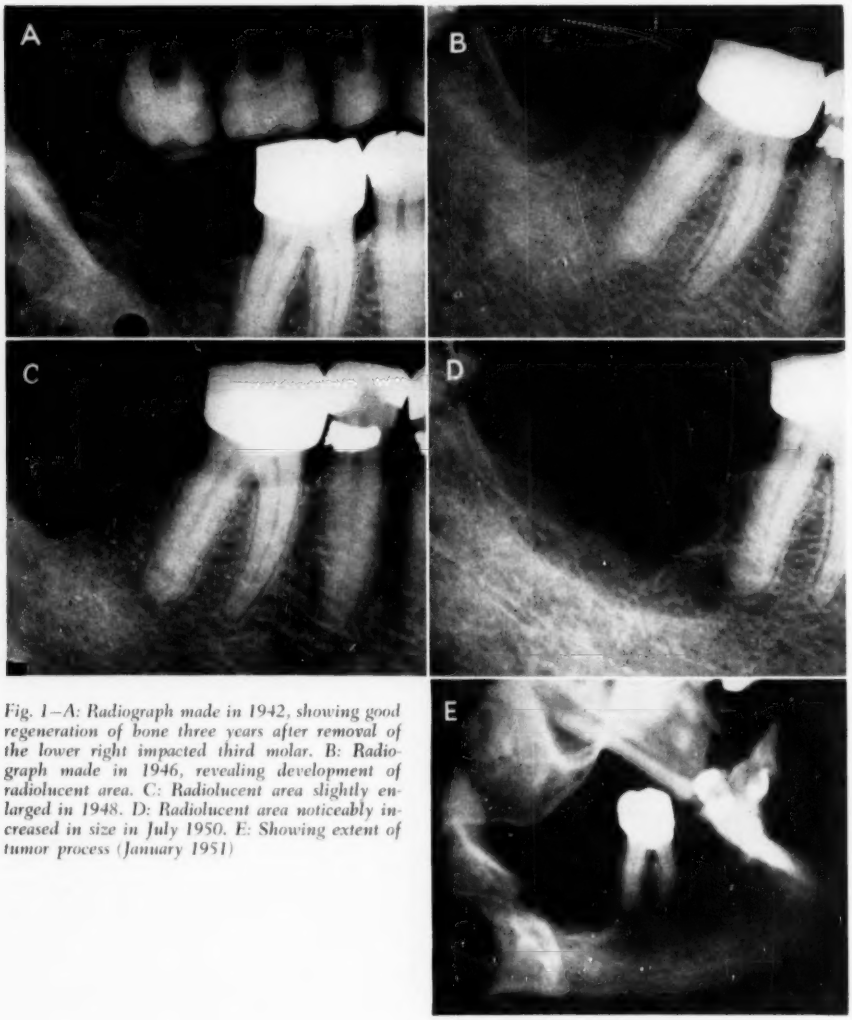



*Fig. 1—A: Radiograph made in 1942, showing good regeneration of bone three years after removal of the lower right impacted third molar. B: Radiograph made in 1946, revealing development of radiolucent area. C: Radiolucent area slightly enlarged in 1948. D: Radiolucent area noticeably increased in size in July 1950. E: Showing extent of tumor process (January 1951)*

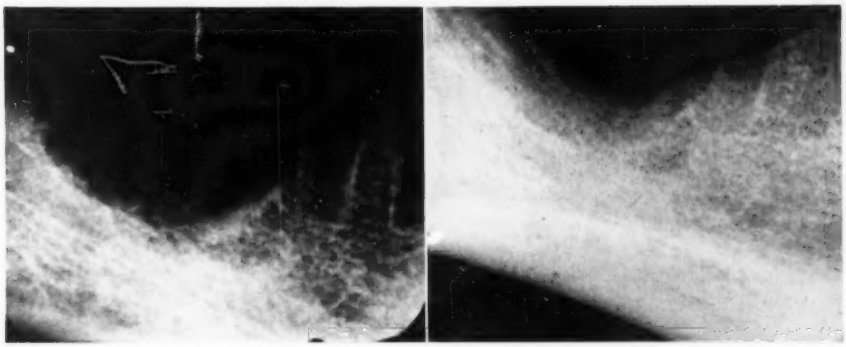


*Fig. 2—Left: Radiographic appearance one month after removal of tumor. Right: Seven months postoperatively, the radiograph shows good regeneration of bone*

first molar was removed, as it appeared to be involved in the tumor process. A portion of the overlying mucosa was excised, since it was intimately involved in the tumor. The wound was partially closed with silk interrupted sutures. The cavity was loosely dressed with a ½ in. iodoform gauze strip saturated with an analgesic-antiseptic ointment.

The patient experienced minimal postoperative difficulties and was discharged from the hospital January 13. She was instructed to return for outpatient care.

Dressings were continued until the cavity was sufficiently reduced in size to allow the patient to keep it clean by irrigation with a water syringe. On February 6 complete tissue fill-in was noted. A radiograph made at that time is shown in Figure 2, left.

A radiograph (Fig. 2, right) taken August 8 revealed some evidence of bone regeneration.

## ■ The Nation's Health

The health of the American people operated at peak load in 1952, according to Dr. Louis I. Dublin, second vice-president and statistician of the Metropolitan Life Insurance Company, with continuing good propects for 1953.

For the fifth year in succession the death rate, which was 9.6 per 1,000 population in 1952, has been below 10; the 1952 rate, indeed, considering the number of older persons in population, is probably the lowest in history.—*"Death Takes a Half Holiday," The New England Journal of Medicine 248:209 January 29, 1953.*

# Metastatic carcinoma of the mandible: *report of cases*

■ *Harry M. Seldin, D.D.S.; S. Daniel Seldin, D.D.S., and William Rakower, D.D.S., New York*

The clinical characteristics of malignant tumors are well known. Since they are capable of metastasis, they will, unless destroyed by surgery, by irradiation or by certain cancerocidal chemicals, result in death of the patient.

Primary malignancies which arise within the mandibular or maxillary bone usually are of connective tissue origin and are, therefore, sarcomas. Carcinomas, being epithelial in origin, usually do not arise within bone. An exception to this rule are those carcinomas which arise within the maxillary antra and the extremely rare carcinomatous transformation of an ameloblastoma or odontogenic cyst. A primary malignant tumor may disseminate throughout the body by way of the blood or lymph stream. Local spread through the lymphatics to the regional lymph nodes occurs frequently, but metastasis to distant sites is probably by way of the blood stream.[1]

Carcinomas frequently metastasize to the bony skeleton but the upper and lower jaws rarely are involved.[2] Certain types of carcinomas cause skeletal metastasis more frequently than others. Listed in order of frequency they are carcinoma of prostate and lungs, hypernephromas, carcinoma of the breast and carcinoma of the thyroid gland.[3] Skeletal invasion is uncommon in those types of malignancy in which tumor emboli are screened out by the sinusoids of the lymph nodes, such as squamous cell carcinoma of the skin and the oral cavity.[2]

The diagnosis of a metastatic carcinoma of the mandible must be made by exclusion of a primary jaw tumor, confirmed by a search for the primary focus and must be substantiated by histological examination.[1] Histologically, the metastatic lesion resembles the primary focus. Diagnosis of the primary tumor sometimes is made only after histologic examination of the metastatic lesion.[4]

In the past five years, four cases of metastatic carcinoma of the mandible have come under our care.

CASE 1—The patient, a 47 year old white woman, came for examination on January 31, 1947. Her chief complaint was pain of several months' duration in the region of the lower anterior teeth. There was no history of trauma.

Examination revealed normal-appearing lower anterior teeth with no evident pathologic condition in the gingival tissues. The lower central and left lateral incisors were slightly mobile but were not sensitive to percussion. No cervical nodes were palpable. Roentgenographic examination of the lower anterior region revealed alveolar bone destruction about the roots of the lower central and left lateral incisors (Fig. 1). A tentative diagnosis of periodontal infection or localized osteomyelitis was made.

The involved lower incisor teeth were extracted under general anesthesia. Spongy spicules of bone combined with abnormal soft tissue adhered to the roots of the extracted teeth. This was not typical either of periodontitis or osteomyelitis; therefore, the teeth with the adherent tissue were sent to the laboratory for microscopic examination. Chemotherapy con-

1. Ward, G. E., and Hendrick, J. W. Diagnosis and treatment of tumors of the head and neck. Baltimore, Williams & Wilkins Co., 1950.

2. Geschickter, C. F., and Copeland, M. M. Tumors of bone. Philadelphia, J. B. Lippincott Co., 1949.

3. Weinmann, J. P., and Sicher, H. Bone and bones; fundamentals of bone biology. St. Louis, C. V. Mosby Co., 1947.

4. Sarnat, B. G., and Schour, I. Oral and facial cancer. Chicago, Year Book Publishers, Inc., 1950.

sisting of 2 Gm. of sulfadiazene initially and 1 Gm. every four hours thereafter was instituted.

After the surgery was completed, a more detailed history was taken. It was learned that the patient had undergone a radical mastectomy for carcinoma eight months previously.

After macroscopic examination of the tissue removed from the mouth, the pathologist reported that it was firm and leathery and that it adhered to the tooth root. The tissue was shaved off for sectioning. Microscopic examination revealed a densely-knit mat of fibrous connective tissue seeded with malignant cells. These cells clearly were epithelial derivatives. Where the growth restraint was least, they "pooled" in islandlike masses without intercellular stroma. In other fields they grew in small alveolarlike packets. Where environmental fibrous tissue was most constricting, they formed tight hyperchromatic cords. It was the differentiation of these anaplastic cells to the alveolar form which suggested origin from a distant site. The diagnosis was metastatic carcinoma, probably of breast origin.

The patient was referred back to her oncologist.

The breast origin of this malignancy was later confirmed by re-examination of the original sections. Histologically, the lesion in the breast and the one in the mandible were the same. The patient died in May 1948.

CASE 2—A 58 year old white woman first came for examination on October 22, 1947 having been referred by her dentist. She complained of a swelling and pain in the region of the left body of the mandible which had started about four to six weeks previously. Her dentist had extracted the lower left second bicuspid in April 1947, the lower left second molar in June and the lower left cuspid in August of the same year. The dentist had had no particular difficulty with the extractions and saw nothing unusual at the time. On October 1, her dentist had made an intraoral incision into a recently developed region of swelling. The patient stated that for the past few days she had been given penicillin both intramuscularly and orally. She gave the further history of having had a breast removed three years before because of carcinoma.

Examination revealed a large, firm swelling extending from the lower left central incisor to the region of the lower left second molar. The former incision could be seen in the lower left bicuspid area. No cervical nodes were palpable.

Roentgenographic examination revealed a large area of radiolucency extending from the lower left second molar region to the lower right cuspid. There was no cortical expansion and no attempt at walling off. Instead, the lesion seemed to be eroding and infiltrating the cancellous portion of the left side of the mandible so that the bone surrounding the central portion of the lesion had a definite moth-eaten appearance. The cortical bone at the inferior border of the mandible was thinned to the extent that pathological fracture appeared imminent (Fig. 2). A tentative diagnosis of metastatic carcinoma from the breast was made.

Under nitrous oxide-oxygen anesthesia, a portion of the lesion (4 by 4 by 0.5 cm.) was removed for biopsy. There was profuse bleeding which was controlled by the use of oxidized cellulose. The incision was closed with interrupted sutures. The biting pressure against the mouth prop and masticatory muscle spasm during general anesthesia caused a fracture in the lower left molar region through the main portion of the destructive lesion.

The pathologist reported that microscopic examination of the section showed an unre-

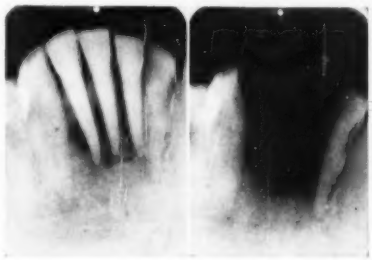


*Fig. 1—Case 1. Preoperative and postoperative roentgenograms taken January 31, 1947. There is bone destruction about roots of lower left central and lateral incisors and lower right central incisor*

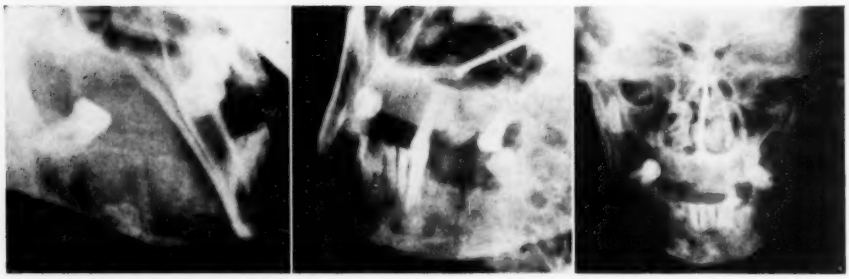


*Fig. 2—Case 2. Left: Left lateral projection showing central portion of lesion, October 22, 1947. Center: Right lateral projection showing extent of lesion toward right side, October 22, 1947. Right: Posteroanterior projection showing extensive involvement of mandible*

strained growth of malignant cells, clearly of epithelial origin, only rarely differentiating to a gland form and imperfectly lining a pseudolumen. For the most part they grew in compact alveolar forms without intercellular stroma. Even there the cancer cells sprawled over into the meager supporting stroma. Where no definable forms were found the cells literally crept through the stroma in packets, simulating carcinoma of the scirrhous type.

The diagnosis was adenocarcinoma which had metastasized from the breast. The patient died in January 1948.

CASE 3—A 60 year old white man was referred by his dentist on July 27, 1948. His chief complaint was a large swelling over the left angle of the mandible. This had been noticed first about two or three months previously. At that time he went to a hospital but was discharged after roentgenographic examination. Approximately five weeks prior to our examination he had gone to another hospital where he stated that he was operated on and a piece of bone had been removed from the left side of the mandible. He was discharged from that hospital June 27, 1948.

Intraoral examination revealed a large, firm swelling in the lower left edentulous molar region. Fluctuation of the mass could be felt with the palpating fingers. Extraorally a large, firm circumscribed swelling was evident overlying the left angle of the mandible (Fig. 3, left). No cervical nodes were palpable. Roentgenographic examination revealed the mandible to be missing from the lower left third molar region to midway up the left ramus. In its place, a soft tissue mass could be visualized. Anterior to this region of complete bone loss was another much smaller, circumscribed radiolucent area in the body of the mandible near the inferior border (Fig. 3, center and right). A provisional diagnosis of carcinoma or osteogenic sarcoma was made.

Under local conduction anesthesia, the region was opened for exploration and a segment of the tumor mass was removed for biopsy. The incision was closed with interrupted sutures.

The pathologist reported there were many soft, white, irregular fragments of tissue. The microscopic examination of the section showed a small rim of squamous epithelium and underlying tissues. A pathologic condition was found in the underlying tissues. This was made up of an extensive lawless infiltration with anaplastic atypical epithelial cells. Many mitoses were present. The epithelial cells, although definitely anaplastic and thereby very poorly differentiated in places, suggested squamous type. In some regions spaces were filled with tumor cells giving a suggestion of duct character. The diagnosis was very poorly differentiated carcinoma. The pathologist suggested that this tumor originated

as a squamous type and was thereby local but that an investigation to determine the possibility of this tumor representing a secondary growth should be made. This type of tumor should be radiosensitive.

Subsequent physical examination revealed the blood count, urinalysis and blood chemistry determinations to be well within normal limits. Cystoscopy revealed a mass in the bladder obstructing the right ureter. Biopsy of this mass revealed a diagnosis of carcinoma which was histologically similar to the tissue removed from the mandible. Roentgenographic study of the skeleton revealed several osteolytic regions involving the ribs, right humerus, occiput and ilium. The left humerus had a region of bone destruction which had caused a pathologic fracture.

Radiation therapy was instituted. The patient's condition degenerated rapidly and he died September 23, 1948.

CASE 4—A 46 year old white man came to the office May 23, 1950 having been referred by his dentist. He complained of a mass growing out of the socket of an extracted tooth. The lower right second molar had been removed five weeks previously. Three weeks later the patient noticed a growth starting to extrude from the socket. It continued to enlarge until May 23. Six months previously the patient had had a lung tumor removed.

Examination revealed a firm, round, grayish mass, approximately 2 cm. in diameter, extruding from the lower right second molar socket (Fig. 4, above). Roentgenographic examination of the region revealed a slight loss of bone of the alveolar crest (Fig. 4, below).

Under local conduction anesthesia, the entire mass was removed. It was well defined and enucleated readily, except where the lingual plate of the mandible had been destroyed and the mass was adherent to the lingual soft tissues.

The provisional diagnosis was tumor which had metastasized from the lung or infected granulation tissue. Examination showed an oval mass of granular tissue with the consistency of fish flesh. The microscopic examination showed that both sections had the aggressive character of malignant cells. Massive invasion of the submucous tissues had occurred. The epithelium over the focus of invading cells was stretched but was otherwise unchanged. The cancer cells were poorly differentiated and piled up in great profusion against one another. For the most part they were round to oval to ovoid. Where growth was restricted by environment they stained heavily, ran in "schools"

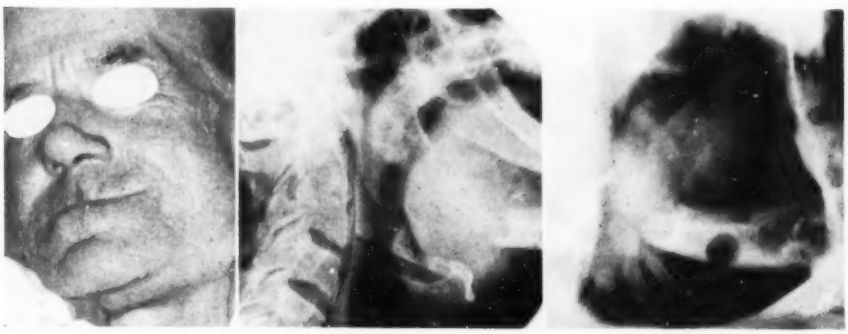


*Fig. 3—Case 3. Left: Showing swelling over left angle and ramus of mandible, July 27, 1948. Center and right: Left lateral projections showing extent of main lesion midway up ramus and smaller one in body, July 27, 1948*

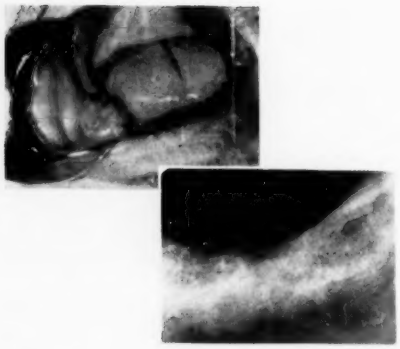


*Fig. 4—Case 4. Showing mass extruding from socket of recently extracted lower right second molar, May 23, 1950 and intraoral roentgenogram of region*

and were suggestively oat-shaped. Nowhere did they accept an alveolar form.

The pathologist's diagnosis was metastasis from undifferentiated stem cell bronchogenic carcinoma. The patient died in December 1950.

DISCUSSION—Systemic symptoms due to the primary disease focus eventually develop.[1] Osseous metastasis is most common in cases of mammary, prostate, renal, thyroid and pulmonary carcinomas where treatment is late and ineffective.[2] The oral surgeon may see jaw metastases, but he must remember that there also may be involvement of the pelvis, spine, skull and long bones. Roentgenographic study of these regions should be carried out routinely.

One of the earliest symptoms of metastatic carcinoma of the mandible may be pain. Later, as the tumor continues to grow, there is evidence of bone destruction, pain increases and eventually may be associated with paresthesia caused by nerve compression. Bone destruction results in the loosening and separation of any teeth which are in the area.[4] The so-called loose tooth, therefore, is shown again to be an important sign of possible malignancy. The value and necessity of good roentgenographic study before any oral surgical procedure, even the removal of a loose tooth, must be emphasized.

In Case 2 and Case 4, teeth in the pathologic region had been removed more than a month before biopsy was carried out. In Case 1, there was loosening of the teeth and bone absorption simulating periodontal disease. Biopsy in this case was done immediately. Metastatic carcinoma may enlarge and destroy bone to such an extent that not only do teeth loosen but actual pathologic fracture may occur. This is illustrated in Case 2 and Case 3.

The differential diagnosis of lesions by roentgenographic study alone may be difficult and usually is tentative. The final diagnosis always must rest with microscopic study.

SUMMARY AND CONCLUSION—Four cases of carcinoma which had metastasized to the mandible are reported. Two women, 47 and 58 years of age, had carcinoma of the breast as the primary focus. One man, 60 years old, had as the primary focus a carcinoma of the bladder. The other man, 46 years of age, had a carcinoma of the lung as the primary lesion.

Metastatic carcinoma of the jaws is a rare condition which the oral surgeon may see occasionally in his practice.

The prognosis of metastatic carcinoma of the mandible is extremely poor.—57 *West Fifty-seventh Street.*

## ■ Words as Instruments

The use of language can become an instrument of health and joy just as its abuse can act as a vehicle of discouragement and misery. We can strike with a word sometimes more effectively than with the fist; by words we can help and hurt, inspire and dishearten, give value to a matter or throw it into oblivion.—*William G. Niederland, Man-Made Plague: A Primer on Neurosis.*

# Removal of foreign body from the maxillary sinus: *report of case*

■ *Daniel Verne, D.D.S.**

The oral surgeon in many instances is justified in performing an exploratory operation for diagnostic purposes. In the case presented in this article there was no roentgenographic evidence of a foreign body in the maxillary sinus. The decision to operate was based on clinical signs and the distress of the patient. The foreign body obtained from the maxillary sinus was not radiopaque and was unsuspected from the previous history.

HISTORY OF CASE—The patient, a well-nourished white woman of 45, came for the first examination on March 28, 1951, complaining of pain in the right maxillary region, particularly when digital pressure was applied over this area. Pain existed in the right temporal region also. The patient complained of a continuous bad odor in the nasal cavity and a disagreeable taste. She stated that she was expectorating pus at all times and that sleep was intermittent because of pain.

The patient reported that a maxillary right second molar had been removed one week previously on March 21, 1951. According to the patient, the extraction had been difficult and time-consuming. A few days after the extraction there had been a hemorrhage from the tooth socket, and the patient had arrested the bleeding by pressing wads of cotton into the area of hemorrhage. There was no history of any systemic disturbance or debilitating disease.

From an external view the maxillary region on the right side appeared slightly swollen. Intraoral examination revealed an extraction wound in the maxillary right second molar region, which appeared to be healing satisfactorily. Close examination, however, revealed a small opening in the ridge. A probe disclosed that this opening communicated with the maxillary sinus. After the probe was withdrawn, a small amount of pus flowed from the region.

Pain was pronounced over the maxillary sinus when pressure was applied over the maxillary bone on the right side. The patient complained of a "stuffy" feeling in the nose. None of the teeth, examined clinically or by roentgenograms, seemed to be causing the disturbance.

Periapical, occlusal and lateral roentgenograms of the maxillary sinus were taken; but none of these revealed the presence of a tooth fragment or any other foreign body. Penicillin (300,000 units) was administered intramuscularly, and the patient was seen again on April 6, 1951. Since no relief had been obtained by that time, it was decided that the sinus should be opened and its contents explored by means of a Caldwell-Luc operation.

Under butethamine hydrochloride anesthesia, an incision was made over the right maxillary cuspid in a vertical direction parallel to the long axis of the root. The gingival tissues were elevated around the necks of the teeth posteriorly to the region of the first molar. The flap was reflected upward and the bone exposed in the canine fossa. With a bur, holes were drilled into the bone in a circle the diameter of a nickel. This circle was made above the apexes of the bicuspids. The bone within the holes made by the bur was removed to allow adequate access to the maxillary sinus.

Immediately after entry into the sinus, a copious amount of pus gushed from the opening. Exploration revealed a thickened membrane with no polyps. On the medial wall and toward the roof of the sinus in the location of the

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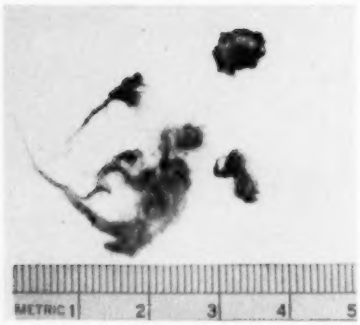


*Cotton wad in sinus*

ostium of the maxillary sinus a foreign body was detected. Close examination revealed a mass of cotton, approximately 2 cm. in diameter (illustration), plastered against the ostium of the maxillary sinus. It was removed with difficulty since it adhered to the bony wall. A small piece of bone was attached to it. The sinus was cleansed thoroughly of all unhealthy tissue. The flap was sutured into place, and about 5 cm. of iodoform gauze was placed at the inferior border of the incision to provide drainage. The tooth socket was cleared of all unhealthy granulation tissue.

Penicillin (300,000 units) was given the day of the operation and again on the following day. The patient was instructed to use a commercial nasal vasoconstrictor to shrink the nasal mucosa and thus to allow for better drainage. The drain was removed on the second postoperative day.

The patient made a rapid recovery. On the first postoperative day there was a complete cessation of the pains in the temporal region and over the right maxilla. The stuffiness in the nose disappeared within three days, and the odor and taste of suppurative material were absent.

The incision closed uneventfully, and the communication into the antrum through the tooth socket could not be detected on the seventh postoperative day. Examination of the patient eight months later on December 10, 1951, revealed no evidence of an oroantral opening; furthermore, there were no symptoms of distress.

SUMMARY—The cotton found in the maxillary sinus may have been forced there originally by the patient. In any case, the cotton was driven to the ostium of the maxillary sinus by the natural ciliary movement of the mucosa of the sinus. After the natural drainage point of the sinus was blocked, the patient experienced pain and discomfort. The cotton could not be detected by roentgenograms. Only by an exploratory operation could the diagnosis of infected sinus be established.

■ BENEFITS OF BOOKS

We owe to books those general benefits which come from high intellectual action. Thus, I think, we often owe to them the perception of immortality. They impart sympathetic activity to the moral power. Go with mean people, and you think life is mean. Then read Plutarch, and the world is a proud place, peopled with men of positive quality, with heroes and demigods standing around us who will not let us sleep.—*Emerson.*

# General anesthesia in dentistry

THE SUGGESTION to establish a section on anesthesia in the American Dental Association has considerable merit. It is the general feeling that more emphasis should be placed on the use of general anesthesia in dentistry if this important boon to humanity is to be kept and further developed as an integral part of the profession of dentistry.

With the advent of efficient and safe local anesthetic agents, there has been a tendency in some quarters to discount the importance of general anesthesia as a part of office practice. It is universally agreed, however, that general anesthesia frequently is the agent of choice for many oral surgical procedures when the anesthetic can be administered with competence and safety. It, therefore, behooves dentistry and the specialty of oral surgery to foster the development of dental anesthesiologists and oral surgeons who are thoroughly schooled in the field of general anesthesia.

Such a program calls for an increased educational effort, and there seem to be three main ways in which development and stimulation can be brought about.

1. Dental schools must be stimulated to organize a department of anesthesiology with a well-trained dental anesthesiologist as the department head. This will promote improved undergraduate study of both local and general anesthesia and allow for integration of the basic sciences of physiology and chemistry with the field of anesthesia.

2. Clinical training should be made available in the many hospitals and clinics throughout the country with the cooperation of medical and dental anesthesiologists. Here the graduate student can obtain advanced training in anesthesiology, and under expert guidance develop into a mature, well-trained anesthesiologist. If his chosen field is oral surgery, such training would prove of inestimable value in his future practice. Fortunately, in a few instances, such training has been made available, but the number of such instances is pitifully small compared to actual needs.

3. A section on anesthesia in the American Dental Association would serve as a coordinating body and indelibly stamp general anesthesia as an integral part of dentistry. There already is a large number of members of the American Dental Association whose interest in anesthesia warrants the founding of such a section. It is hoped that the Board of Trustees will look with favor on a request to form this important section in the near future. It would be another step forward in the development of the science of dentistry and would aid the educational program of oral surgery and anesthesia.—*Fred A. Henny.*

### ■ Treatment of Skin Sensitivity Reaction to Penicillin

*Q.*—How do you treat a skin sensitivity reaction to penicillin?

*A.*—The administration of antihistamines should be started immediately. One effective choice is tripelennamine hydrochloride (Pyribenzamine) 50 mg. and diphenhydramine hydrochloride (Benadryl) 50 mg., alternating every four hours. Calamine lotion can be used as necessary for local relief.

If it is desirable to continue antibiotic therapy, another antibiotic should be used, the choice depending on the situation. In some situations it may be necessary to continue the use of penicillin despite sensitivity. This may be done, with certain precautions, but usually it is done only when there is no other choice.

### ■ Resistance to Lidocaine

*Q.*—We have been using 2 per cent lidocaine in aqueous solution for local anesthesia with excellent results for the past year and a half. Recently we have encountered two successive failures with this drug—one on infiltration. We are wondering if this compound could have deteriorated while in storage for the past year.

*A.*—Lidocaine is a very stable compound and has an indefinitely long shelf life. It does not have the fragile ester linkage of procaine and will withstand several hours of boiling in strong alcoholic potassium hydroxide without decomposing. Since heat does not readily alter its chemical structure, lidocaine may be autoclaved repeatedly when contamination of the drug is suspected.

It is our impression that it is just a coincidence that two successive patients have shown resistance . . lidocaine. Although resistance to this drug has been reported, as it has for other local anesthetic agents, the incidence is low. In such cases we recommend that procaine, pontocaine or some other local anesthetic agent be substituted.

### ■ Use of Trichlorethylene (Trilene)

*Q.*—We have heard many reports for and against the use of trichlorethylene (Trilene) in general anesthesia in the office. In concentrations above 0.5 per cent we understand that cardiac involvement is almost certain. Would you please advise us on this point?

*A.*—Trichlorethylene (Trilene) is an analgesic to be used for the patient who is a good risk. In this capacity the theoretical limit of 0.5 per cent often may be exceeded without untoward reactions. It is the opinion of the anesthesiologists who have had considerable experience with trichlorethylene (Trilene) that the cardiac irregularities occasioned by the use of this agent are not profound, provided one does not attempt to use it as an anesthetic. Tachypnea and bradycardia are warning signs of overdosage and the concentration of the drug should be reduced or its administration should be discontinued.

This section, devoted to queries and comments from readers on topics of current interest to oral surgeons and general dental practitioners, is edited by James R. Hayward, University Hospital, Ann Arbor, to whom readers are invited to send their communications. The answers, prepared by competent consultants, do not necessarily represent the opinions of any official scientific organization. Your participation in this section is invited.

The Editor

■ TEXTBOOK OF HISTOLOGY. By Jose F. Nonidez and William F. Windle. Second edition. 528 pages with 326 illustrations, composed of 214 drawings and diagrams and 233 photomicrographs. Index. Price $9.50. New York, McGraw-Hill Book Company, Inc., 1953.

This edition is essentially the same as the first except for rephrasing and slight expansions of description. Wherever investigations have been conducted in reference to the secretion which is an associated part of the item under discussion, up-to-date information is recorded.

The introductions to chapters have in some instances undergone condensation and in other places, elaboration; marked improvement is apparent in both cases.

The substance of this book is clearly defined. Comparative tables have been placed at the end of many chapters to summarize the chapter's content. References are also listed at the end of each chapter, and the salient features of each reference are stated in contrasting type.

A helpful chapter—not new, but expanded—concerns visual aids pertaining to the subject matter. A listing of the sources from which this material may be acquired is included.

An outstanding feature of the text is the large number of excellent photomicrographs showing the reader material as it is observed under the microscope. This feature stands out in contrast to the schematic distortions of the artist's drawings.—*J. Robert Schumaker.*

■ HISTORY OF ANESTHESIA. By Virginia S. Thatcher. 289 pages with 22 illustrations. Index. Price $5. Philadelphia, J. B. Lippincott Co., 1953.

This book is dedicated to the women who made anesthesia an art that it might become a science. In her preface the author states, "The purpose of this work is to extend the knowledge of anesthetists about themselves beyond the framework of personal references and of already published histories. . . . If the place of the nurse as an anesthetist receives special emphasis in this history, it is because in the others she has been derogated or ignored." Primarily, then, the purpose of this book is to stress the importance of the registered nurse as an anesthetist.

The text is divided into three sections: "Toward a New Art," "Toward a New Science" and "Organized Nurse Anesthesia."

It is difficult to evaluate this volume, as the method of presenting material is quite different from that commonly found in other texts. The author, a registered nurse, appears adequately qualified by training and experience to interpret historical events in the history of anesthesia. The factual contents for the study were obtained from many sources.

While statistics are an important part of the work, they are not burdensome and do not detract from this book. The list of references will be helpful to those who wish to pursue the subject in more detail.—*E. Alan Liehan.*

■ ELEMENTARY MEDICAL STATISTICS. By Donald Mainland. 309 pages. Appendix. Price $5. Philadelphia, W. B. Saunders Co., 1952.

Possibly the outstanding feature of this book is its emphasis on the importance of proper design of experiments. The author points out repeatedly that no handling of statistical data, however technical or refined, can validate an experiment the design of which is essentially faulty. As an elementary work in statistical methodology, this book handles the subjects of statistical reasoning very completely and very well.

However, if one is looking for a book which will show the most efficient way of cal-

culating the various statistics, he should look elsewhere. The calculation of the common description statistics such as the mean, median, standard deviation and correlation coefficient, are either completely ignored or incompletely discussed.

Possibly the book tries to cover too much ground in too little space. Some of the surprisingly advanced topics included in this "elementary" text are curvilinear regression, multiple regression, factorial design, incomplete block design and inverse sine transformations.

One advantage this book has for health statisticians is that the examples are couched in medical terminology. In fact, so many examples of statistical application in medicine are used that this in itself becomes an important educational feature of the book. Readers of the book will surely come to appreciate the tremendous usefulness of statistics in medicine, not only to the research worker but to the practitioner as well.—*B. D. Moen.*

■ ZINSSER'S TEXTBOOK OF BACTERIOLOGY. By David T. Smith, Norman F. Conant, Joseph Beard, Hilda Pope, D. Gordon Sharp and Mary A. Poston. Tenth edition. 1012 pages with 330 illustrations. Index. Price $11. New York, Appleton-Century-Crofts, Inc., 1952.

This is the tenth edition of a classic American textbook which has included among its previous authors, Zinsser, Hiss and Bayne-Jones.

The present authors continue to stress the basic biologic approach to bacteriology and to emphasize the public health significance and practical clinical importance of certain of the biologic characteristics of the organisms.

This edition contains 132 new illustrations and references to literature through 1951-52.

There has been some revision or rewriting of each section, but the greatest increase in subject material is found in the section on filtrable viruses. The section on medical mycology is particulary well adapted to the needs of medical students.

One hesitates to attempt criticism of a book of this caliber but it is possible that medical students might profit by more consideration of the bacteriological problems of oral infections. For example, only single short paragraphs are devoted to the subjects of dental caries and focal infection.

Some discussion of gingival lesions is included in the eleven page chapter on "The Spirochetes of Relapsing Fever, Vincent's Angina and Other Diseases," but very few references to dental literature are included.

If this textbook is used by dental students, the instructors should be prepared to supplement their courses by lectures and assigned readings on dental problems.—*H. T. Knighton.*

■ DENTAL ROENTGENOLOGY. By G. H. Hepple. 120 pages with 147 illustrations. Price $3.50. London, Phillips Electrical Ltd. Century House, 1952.

This concise text could well be used as a reference on the mechanical aspects of obtaining adequate dental roentgenograms by the short-cone technic. Basically, the book has three main divisions.

Part I explains the development of the modern dental x-ray unit. The nature and quality of roentgen-ray energy is discussed in a concise manner. Numerous illustrations show the modern equipment in use in Great Britain.

Part II presents a method of obtaining satisfactory periapical, interproximal and occlusal examination of the teeth and jaws. The short-cone method is outlined with completeness and clarity. Excellent illustrations and instructions are given for every intraoral film position. The technic as outlined for extraoral exposures appears to cover all problems incurred in the making of these difficult and important views.

Part III consists of suggestions for the dark room. This includes equipment, processing technic and a list of important accessories which are useful in producing satisfactory roentgenograms.

Although the author gives concise and practical instructions covering all possible mechanical aspects of dental roentgenology, he does not cover interpretation of the films. This he leaves to other texts.—*Robert R. Craig.*

■ Submandibular-Notch Sliding Osteotomy for Surgical Correction of Mandibular Retrusion, A New Technic. Arthur E. Smith and Marsh Robinson. Am. J. Surg. 85:606 May 1953.

A new surgical procedure has been devised for the reconstruction of the retruded mandible. Patients for whom this procedure is desirable usually seek help because of their appearance. Often the patient voluntarily states that the deformity has marred his happiness and interfered with his normal employment and social success.

Success of the procedure depends on an accurate preoperative determination of the angle and extent of the osteotomy. The postoperative position to be selected is the one which establishes the best intermaxillary relation and occlusion.

The procedure consists of a technic called the L-step submandibular-notch sliding osteotomy. One case report is used to illustrate the technic.—C. *Dean Couch, Jr.*

■ Paralysis of the Muscles of the Chin. Hector Marino. Surg., Gynec. & Obst. 96:433 April 1953.

Paresis or paralysis of the depressor muscles of the lower lip (quadratus labii inferioris and mentalis) is relatively frequent. A simple and effective procedure proposed for correction of unilateral paralysis is excision of a portion of the ramus marginalis mandibulae of the facial nerve of the unaffected side. This operation is performed through a minimal incision at the angle of the mandible and controlled by electrical investigation.

In operations on seven patients, the results have been uniformly good. The patients have complained of no inconvenience from the moderate reduction in size of the oral aperture or from the paralysis of the lower lip depressors. Speech has not been altered. Up to the present time in none of the cases has there been any recurrence of the deformity.—C. *Dean Couch, Jr.*

■ The Fate of Recurrent or Persistent Parotid Tumors. Danely P. Slaughter, Harry W. Southwick and Leroy Walter. Surg., Gynec. & Obst. 96:535 May 1953.

The majority of parotid tumors are benign, but the incidence of cancer is higher than is generally appreciated. All mixed tumors will recur if they are incompletely removed, but most of them retain their original microscopic structure. If allowed to persist over many years, malignant transformation may occur; but this transformation is more likely to occur in atypical, unusually cellular, mixed tumors whose diagnosis is equivocal.

In a series of 12 cases, parotid cancer was considered to have originated from benign mixed tumors. In 2 cases clinically benign tumors persisted for more than 40 years before cancer occurred. It is probable that complete excision at any time in their benign course would have avoided the termination as fatal cancer.

In 212 cases of parotid tumor 60 per cent were benign mixed tumors, of which a third were recurrent when first observed. Recurrent or persistent mixed tumors may become malignant in time. In a series of 55 cases of cancer there were 12 cancers which were believed to have originated from pre-existing benign tumors. The incidence of actual cancer in tumors of the parotid gland is at least 20 per cent, or 1 tumor in 5; in this series it was 26 per cent.—C. *Dean Couch, Jr.*

■ DOUBLE PIN FIXATION IN FACE AND JAW FRACTURES. John W. Gerrie. Am. J. Surg. 85:629 May 1953.

During the past ten years, double-pin splints have been used in the treatment of maxillofacial injuries at the Montreal General Hospital. Of 750 fractures over the ten year period since the introduction of double-pin fixation, 110, or 15 per cent, have been double-pinned.

The type of pin used most successfully is one with an ordinary screw head. The pins, which are carried through both cortices of the bone, hold snugly for as long as three months. A modification of the Anderson splint, devised by Stout and Fairbank, is the splint which has withstood the test of time.

The double-pin method has been employed in the treatment of about 20 per cent of the fractures not involving teeth and has proved practical. The pins are removed any time after the twenty-first day. The only complications occurred in the first cases and consisted of seepage around the pin and loosening of the pin.—*C. Dean Couch, Jr.*

■ CLASSIFICATION OF GLANDULAR TUMORS OF SALIVARY GLANDS. William H. Bauer and John D. Bauer. Arch. Path. 55:328 April 1953.

Benign and malignant glandular neoplasms of the salivary glands vary in structure from the common pleomorphic adenoma (so-called "mixed tumors") to true adenoma, oxyphilic granular cell adenoma, papillary cystadenoma lymphomatosum, lymphomatoid adenoma, papillary cystadenoma, mucoepidermoid tumor and adenocarcinoma of cylindromatous, papillary and acanthomatous type. Although these tumors differ in their main structural details, they have a common origin in the epithelial cells of the lining of the intercalated ducts and less often of the acini. The intercalated ductal epithelium is the matrix of the acinous epithelium and possesses the ability to differentiate into oxyphilic granular, mucous, squamous, sebaceous and "clear" cells. The neoplastic cells, however, may originate from the adult cells of the acini and the larger ducts. The plasticity of the epithelium accounts for the common admixture of features characteristic of different groups.

The so-called "mixed tumor" of the salivary gland is considered to be a pleomorphic adenoma arising from ductal epithelium and exhibiting a peculiar combination of mucoid and pseudocartilaginous material which is a product of secretion, of degeneration of epithelial cells and of hyalinization of the stroma. Regions of cartilage and bone may be observed in the tumor.

True adenoma of the parotid gland is an uncommon but distinct neoplasm composed of glandlike structures or cords of the acinous and ductal epithelium.

Oxyphilic granular cell adenoma (oncocytoma) is composed of large eosinophilic cells with oval or round nuclei with reticular chromatin. The gradual transformation of the basophilic cytoplasm of the ductal epithelium into a granular oxyphilic cytoplasm seems to incite the cells to proliferate and to form papillary projections into cystic cavities. Compressed eosinophilic cells with pyknotic nuclei are regarded as degenerated. The tumor is of multicentric origin.

Papillary cystadenoma lymphomatosum differs distinctly from oxyphilic granular cell adenoma because of its lymphoid aggregations, although it may display columnar oxyphilic granular cells in the papillae. The findings of lymphoid tissue in a great number of normal parotid glands from persons of various ages led to the conclusion that this tumor originates in the parotid gland and not in the adjacent lymph nodes.

The name "lymphomatoid adenoma" is proposed for a rare neoplasm of the parotid gland. The tumor is neither an adenolymphoma nor a lympho-epithelioma. Lymphomatoid adenoma is a clinical and pathological entity arising either in the lymphoid aggregates in the parotid gland or in the paraparotid lymph nodes.

Papillary cystadenoma of the salivary glands is a clinical and pathological entity. The occasional occurrence of epidermoid regions in the base of the papillae or in the papillae proper is not sufficient reason to include this tumor in the papillary mucoepidermoid group, for mucin is not detectable. A "water-clear cell" variant is

of interest. The arrangement of large hydropic cells with pyknotic nuclei is indistinguishable from that in renal adenocarcinoma.

The mucoepidermoid tumor is regarded as a clinical and pathological entity. The occurrence of three cases of microscopic malignant mucoepidermoid tumors of the parotid gland in very young girls is noteworthy. The mucoepidermoid tumors display an extremely wide range of differentiation of epithelial cells into mucous, epidermoid, "clear" and sebaceous cells.

Adenocarcinoma of the salivary glands, observed mostly in the parotid gland and less often in the submaxillary gland, is of cylindromatous, papillary, cystic or adeno-acanthomatous type.—C. *Dean Couch, Jr.*

■ Methods of Immediate Repair After Major Resections of the Face and Jaws. Arthur W. von Deilen. Plast. & Reconstruct. Surg. 11:152 Feb. 1953.

Carcinoma should be treated radically, either by surgery or radiations of some sort. If surgery is selected, it should be as radical as is compatible with life. Some simple method of preventing the contraction of the remaining raw surfaces should be instituted at the time of operation to preserve whatever function may be left. Prosthetic appliances also should be constructed, if indicated, to keep parts in their normal positions. Patients would then be in a position to make the most of what they had left in the final reconstruction. Recurrences, if they do appear, will not be hidden by skin grafts, and flaps will not cover them for long. The already uncertain future of the patient will not be affected greatly, but his present existence and comfort will be affected tremendously if simple restorative methods have been carried out. If further surgery has to be performed after a recurrence of disease, then the original operative procedure was not nearly radical enough.

The immediate covering of raw surfaces alone will prevent 50 per cent of the deformities seen today. If contracture and distortion of the remaining tissues are prevented, the task of reconstruction is accomplished by adding the missing parts. This is simple compared to the unraveling of a mass of scar when the remaining tissues have shrunken into a ball.

Three basic problems are dealt with in this discussion: (1) restoration after resection of one or both superior maxillae, (2) restoration after resection of the lower lip, anterior mandible, floor of the mouth, and anterior portion of the tongue, and (3) restoration after resection of half the mandible with portions of one cheek, floor of the mouth and side of the tongue. Radical dissection of the neck may or may not accompany these procedures.—C. *Dean Couch, Jr.*

■ Fracture of the Maxillary-Zygomatic Compound with Atypical Involvement of the Orbit. John W. Gerrie and William K. Lindsay. Plast. & Reconstruct. Surg. 11:341 May 1953.

Fracture of the maxillary-zygomatic compound or cheek bone is usually a typical fracture with or without minor malpositions of the orbital contents. Atypical fracture patterns in the orbit, however, can and do occur with serious complications.

In one case the fracture line passed through the superior orbital fissure and optic foramen, and a fragment probably hooked onto the sphenoid ledge in the region of the anterior clinoid process and prevented reduction. Sensory motor ophthalmoplegia occurred immediately; visual impairment became progressively evident. Orbital decompression was considered; but the progressive, although slow, recovery contraindicated the procedure. The clinical signs and the roentgenographic evidence indicated involvement of the superior orbital fissure and the apex of the orbit.

There was immediate involvement of the oculomotor nerve, the trochlear nerve, and the first divisions of the trigeminal and abducens nerves. These nerves were probably contused in the rounded medial end of the supraorbital fissure, where they are in close proximity; but their paresis could have been caused by pressure from a retro-orbital hematoma.

The lesions of the oculomotor, trochlear and abducens nerves were incomplete as evident from their early complete recovery. The

lesion of the first division of the trigeminal nerve was probably complete, and its recovery is still indefinite. Involvement of the optic nerve appeared late. It could have been due to the pressure from a callus in the optic foramen, from thrombosis of the optic nerve veins or from cicatrization about the optic nerve from an organizing retro-orbital hematoma. There was a unilateral Argyll Robertson pupil for which there was no satisfactory explanation.—*C. Dean Couch, Jr.*

■ ALLERGY TO PROCAINE HYDROCHLORIDE WITH THREE FATALITIES. Leo H. Criep and Creso de Castilho Ribeiro. J.A.M.A. 151:1185 April 4, 1953.

This report deals with three fatalities observed by the authors during the past year resulting from an immediate reaction to procaine hydrochloride; one of these occurred after anesthesia for a tooth extraction.

Reactions to local anesthetic drugs may be divided into toxic and allergic reactions. Allergic reactions to drugs such as procaine hydrochloride may be divided as follows: (1) contact dermatitis, (2) serum sickness, (3) type of serum reaction, anaphylactic or accelerated, and (4) atopic reactions. Two of the fatalities reported were due to the anaphylactic type of reaction and one from the atopic type of reaction.

The anaphylactic or accelerated type of serum reaction occurs after the second or a subsequent injection of a drug. It is brought about by previous sensitization. It is sudden in onset and of great severity; there may be shock and serious respiratory involvement. It may be fatal. Treatment of this type of reaction must be prompt and adequate. It includes supportive measures, sympathomimetic drugs administered intravenously, antihistaminics, oxygen, sedatives, digitalis, and cortisone or corticotrophin.

Patients who are allergic by heredity may be sensitive to procaine hydrochloride in such a way that immediately on exposure severe bronchial asthma, urticaria or angioneurotic edema may develop. The suddenness of onset of reactions and their extreme severity may cause death. Treatment of these reactions includes the use of oxygen, sympathomimetic drugs, antihistaminics and corticosteroids.

Since drugs such as procaine hydrochloride are not protein in nature and since their antigenic property is due to their combination with body proteins, skin tests are of no diagnostic value in these types of reactions. Therefore, before procaine hydrochloride and related drugs are used, they should be applied with an applicator intranasally. If the patient is severely sensitive, untoward symptoms will develop within a few minutes. As a test, the drug may also be applied sublingually or intraconjunctivally. These tests are simple and not time-consuming. If the preliminary test is negative, then it may be assumed that further administration of the drug is relatively safe.—*C. Dean Couch, Jr.*

■ AFFECTIONS OF THE FACIAL NERVE. F. D. Lathrop. J.A.M.A. 152:19 May 2, 1953.

The facial nerve is a mixed nerve and, therefore, the severity of a disorder affecting it depends on whether the smaller sensory component or the larger motor division or both are involved in the pathological disturbance. The indication that the sensory portion is involved is usually pain in the ear. Indications of the involvement of the motor component usually are paresis, paralysis or hyperkinesia of the muscles of expression. When both components are involved, pain in or about the ear and paralysis of the face occur.

The seventh cranial nerve may be involved as an entity just as any organ of the body. The most commonly encountered affection of the seventh cranial nerve is paralysis of the face, which may be secondary to Bell's palsy or to an injury through direct trauma to the nerve. This paralysis has a profound effect on the economic and psychological adjustment of the patient so afflicted. Other disorders of this cranial nerve may be even more distressing and disabling.—*K. Tessler.*

# Announcements

## ■ American Society of Oral Surgeons to Meet October 21-24 in Houston, Texas

The thirty-fifth annual meeting of the American Society of Oral Surgeons will be held October 21-24 at the Shamrock Hotel, Houston, Texas. Examination of candidates for membership will be held October 17-21. Candidates appearing for examination are eligible to attend the meeting.

Registration of members and candidates will begin Wednesday, October 21, when the exhibit will be opened. The first general session will begin at 9:30 A.M. Thursday, October 22.

Application forms for membership in the American Society of Oral Surgeons may be obtained by writing to Miss Ruth F. Whalen, executive secretary, 1112 East Clay Street, Richmond 19, Va. Applications to be presented at the Houston meeting should be filed with the executive secretary well in advance of the meeting date.

## ■ American Board of Oral Surgery Announces October Meeting, Examinations

The American Board of Oral Surgery will hold its annual meeting and examination of candidates October 17-21 at the Shamrock Hotel, Houston, Texas.

Information may be obtained by writing to Leslie M. FitzGerald, secretary of the Board, 718 Roshek Building, Dubuque, Iowa.

## ■ Italian Dental Congress Announced

The twenty-eighth Italian Congress of Stomatology, sponsored by the Italian Dental Association (A.M.D.I.), will be held October 13-17 in Bari, Italy.

Three main topics to be discussed at the Congress are focal dental infection, the economic and social problems arising from dental caries, and fixed prosthesis. An international exhibition of dental equipment will be held in conjunction with the Congress.

Further details may be obtained by writing to Congresso Italiano di Stomatologia, Palazzo Ateneo, Bari, Italy.

## ■ Academy of Anesthesiology to Discuss Resuscitation

A lecture on resuscitation in the operating room and a film on thiopental sodium-nitrous oxide oxygen as an anesthetic will constitute the program of the International Academy of Anesthesiology meeting October 7 at the Hotel Statler, New York.

The lecture on resuscitation will be presented by Claude S. Beck, professor of cardiovascular surgery at Western Reserve University and consultant and surgeon at several Cleveland hospitals.

The film, "Pentothal Sodium-Nitrous Oxide Oxygen Anesthesia in a Dental Office," will be presented by Myer Solomon, member of the Williamsport (Pa.) Hospital Dental Clinic.

Information on the meeting and the Academy may be obtained from Irwin G. Tomack, secretary, 355 East 149th Street, New York 55.

## ■ A.M.A. House of Delegates Amends Definition of Oral Surgery

The House of Delegates of the American Medical Association, at its June 1953 meeting, amended the definition of the scope and practice of oral surgery which had been formulated by the A.M.A. Board of Trustees, the American Dental Association, the American Board of Oral Surgery and the American Hospital Association.

The definition of the practice of oral surgery agreed on in a conference of the above organizations stated that "the oral (dental) surgeon be assigned to the surgical service of a hospital and to perform such professional duties as the chief of the surgical service directed." The A.M.A. House amended the wording "the surgical service" to read "a surgical service."

The A.M.A. House of Delegates also wrote and approved the following definition of oral surgery: "Dental–oral surgery is to be limited to diseases of the teeth and jaws and lesions of contiguous soft tissues related to diseases of the teeth and jaws but excluding malignancies."

## ■ Dental Guidance Council for Cerebral Palsy to Meet

"Observations in the Dental Treatment of Cerebral Palsied Children," by Edward U. Friedman of New York will be one of the featured papers to be delivered at the annual meeting of the Dental Guidance Council for Cerebral Palsy, 8:15 P.M., October 27, at the Midston House, 38th Street and Madison Avenue, New York.

Other papers to be presented are "Types and Incidence of Malocclusion in Cerebral Palsied Children" by Seymour Koster of New York and "Emotional and Mental Problems of the Cerebral Palsied" by Veronica O'Brien, a physician and assistant psychologist at the Grasslands Hospital of Valhalla, N. Y.

The meeting is open to all interested dentists and friends. Further information may be procured from the Dental Guidance Council for Cerebral Palsy, 47 West 57th Street, New York 19.

## ■ Discussion of Geriatrics to Highlight December Meeting

A morning business session, luncheon and a scientific session on "Geriatrics and Related Subjects" will constitute the midwinter meeting of the American Academy of Dental Medicine, scheduled to be held Sunday, December 6, at the Hotel Statler, New York City. The business meeting for members will convene at 10 A.M. Luncheon and round table discussions, open to all interested dentists and physicians, will begin at 12:30 P.M.

Details and reservations may be obtained from the Academy's secretary, William M. Greenhut, 124 East 84th Street, New York 28.

## ■ New York Oral Surgeons to Attend Program at Long Island Naval Hospital

The St. Albans Naval Hospital at St. Albans, Long Island, N. Y., will be the site of the annual fall meeting of the Metropolitan-New York Society of Oral Surgeons, Inc. The all-day session, to be presented November 4, is being planned by Cmdr. Roger Gerry, director of the dental division at the Naval Hospital, and Douglas B. Parker of New York.

Further information may be obtained by writing to S. Daniel Seldin, secretary-treasurer, 57 West 57th Street, New York 19.

## ■ Fédération Dentaire Internationale, Through International Dental Journal, Reports on World Dentistry

*International Dental Journal*, quarterly publication of the Fédération Dentaire Internationale, is being offered to dentists in the United States for a yearly subscription fee of $8.50. Edited by Professor H. H. Stones of the University of Liverpool, the publication contains reports from all over the world on dental research projects, trends, new developments and activities.

Subscriptions may be placed with British Publications, Inc., 30 East 60th Street, New York 22.

## ■ Jewish Sanitarium and Hospital for Chronic Diseases Establishes Research Fellowships

Two fellowships will be awarded this fall for clinical and experimental research at the Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn. The establishment of the fellowships, named in honor of the president of the Hospital, Isaac Albert, was announced recently by the trustees of the Hospital.

Applicants are advised to write promptly to the Superintendent, Jewish Sanitarium and Hospital for Chronic Diseases, Rutland Road and East 49th Street, Brooklyn.

## ■ Relief of Patient's Anxiety Theme of Society Meeting

A Canadian physician, Bernard B. Raginsky of Montreal, will address the fall meeting of the American Society for the Advancement of General Anesthesia in Dentistry which will be held on the evening of October 26 at the Hotel Shelburne, New York City.

Dr. Raginsky will speak on "Pre-Anesthetic Management of the Ambulatory Dental Patient: Survey of the Measures Necessary to Relieve Anxiety and Apprehension." Opening discusser will be Jacob Branower, physician of New York.

Information on the organization and attendance at the meeting may be obtained from the executive secretary of the Society, M. Hillel Feldman, 730 Fifth Avenue, New York.

## ■ F.D.A. Warns of Reactions to Penicillin Preparations

The division of antibiotics of the Food and Drugs Administration has issued a statement citing reports of acute anaphylactic reactions to penicillin preparations. In most of the fatal cases the drug was administered intramuscularly, the statement announced.

The F.D.A. has further cautioned manufacturers of penicillin preparations that their labels must inform the dentist or physician of the possibility of such anaphylactic reactions following the administration of penicillin.

The label or brochure must warn that: "The injection of penicillin in rare instances may cause acute anaphylaxis. The reaction appears to occur more frequently in patients with bronchial asthma, other allergies, or those who have previously demonstrated a sensitivity to penicillin. Care should be taken to avoid accidental intravenous administration, and resuscitative drugs, such as epinephrine, antihistamines, aminophylline, etc., should be readily available for emergency intravenous administration."

Serious reactions have occurred also following the oral administration of tablets or troches, inhalation of aerosols and instillation into the sinus cavities.

# Editorial communications

■ ORIGINAL COMMUNICATIONS—This journal invites concise original contributions in the broad field of clinical and experimental surgery of the mouth and associated structures, including roentgenology, diagnosis, anesthesia and oral surgical pathology. Articles are accepted for publication with the understanding that they are contributed solely to the JOURNAL OF ORAL SURGERY. All manuscripts are subject to editorial modification. Neither the editors nor the publishers accept responsibility for the views and statements of authors expressed in their communications.

■ MANUSCRIPTS—Manuscripts submitted for publication should be sent to Fred A. Henny, Editor, Henry Ford Hospital, Detroit, Michigan.

Manuscripts should be typewritten on one side of the paper only with double spacing and liberal margins. The author's name and the abbreviated title of the article should appear at the top of each manuscript page. The original should be sent to the editor and a carbon copy retained by the author. Manuscripts will not be returned if accepted for publication.

References should be placed at the end of the article and should conform to the style of the Quarterly Cumulative Index Medicus; viz., name of author, title of article and name of periodical with volume, pages, month and year. They should be numbered and should appear in the same order as that of the superior figures inserted in the appropriate positions in the text.

■ ILLUSTRATIONS—Illustrations accompanying manuscripts should be unmounted and numbered. The author's name should appear on the margin or back.

Authors should insert figure numbers at appropriate places in the text. The original drawings, or glossy print photographs of them, should accompany the manuscript. Legends for illustrations are to be typewritten in a separate list with numbers corresponding to those on the photographs and drawings.

A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editors for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered in India ink or with black typewriter ribbon (carbon paper placed with carbon against back of sheet for bolder type). Ordinary blue or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

■ CASE REPORTS—Case reports will constitute an important department of the journal and the editors welcome case reports that are of unusual clinical value or that present exceptional conditions of interest.

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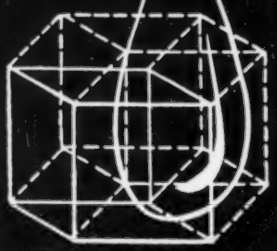

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† Bragdon, C.: *A Primer of Higher Space, New York, Alfred A. Knopf, 1923, Pate 1.*

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Hingson, R.A., N.Y. J. Dent., 30:370 (Oct.) 1950.

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Bristol-Myers Co. ..... 4th Cover

Cook-Waite Laboratories, Inc. ..... A-2

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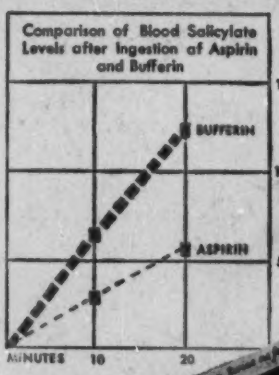


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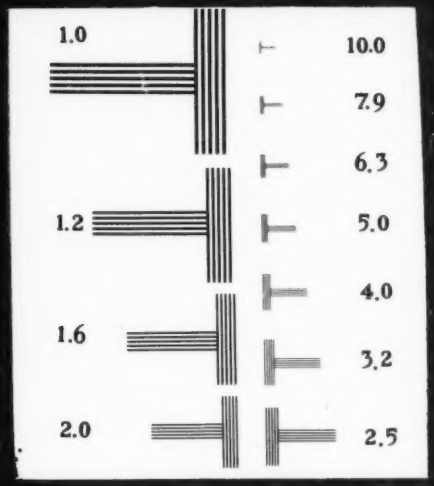


100 MILLIMETERS

**INSTRUCTIONS** Resolution is expressed in terms of the lines per millimeter recorded by a particular film under specified conditions. Numerals in chart indicate the number of lines per millimeter in adjacent "T-shaped" groupings.

In microfilming, it is necessary to determine the reduction ratio and multiply the number of lines in the chart by this value to find the number of lines recorded by the film. As an aid in determining the reduction ratio, the line above is 100 millimeters in length. Measuring this line in the film image and dividing the length into 100 gives the reduction ratio. Example: the line is 20 mm. long in the film image, and $100/20 = 5$.

Examine "T-shaped" line groupings in the film with microscope, and note the number adjacent to finest lines recorded sharply and distinctly. Multiply this number by the reduction factor to obtain resolving power in lines per millimeter. Example: 7.9 group of lines is clearly recorded while lines in the 10.0 group are not distinctly separated. Reduction ratio is 5, and $7.9 \times 5 = 39.5$ lines per millimeter recorded satisfactorily. $10.0 \times 5 = 50$ lines per millimeter which are not recorded satisfactorily. Under the particular conditions, maximum resolution is between 39.5 and 50 lines per millimeter.

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